BG Pulse Journal USA
ISSN:1947-2536 http://www.bgpulseusa.com/index.php/bg

Ergonomic Design of C-Shaped Public Benches and Their Potential to Improve Social Communication

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doi:https://doi.org/10.5281/zenodo.22921841

Abstract: Public benches are commonly designed for individual rest, but their spatial configuration can also influence face-to-face interaction between people. This study investigates whether a C-shaped bench can provide more favorable conditions for social communication than a conventional straight-line bench. The research combined ergonomic analysis, observation of students using straight benches in a school environment, geometric design of a C-shaped bench, and a survey involving 65 residents and students. The proposed bench was designed for three to four users with a seat height of 42–45 cm, seat depth of 48–50 cm, backrest height of 42 cm, backrest angle of 102–105°, an outer radius of 1.7 m, an inner radius of 1.2 m, and an arc angle of 120°. Observations indicated that communication among three people seated on a straight bench typically lasted approximately 10–15 minutes, with body rotation contributing to discomfort. In the survey, 57 of 65 respondents reported that prolonged conversation on straight benches was uncomfortable and indicated that a C-shaped configuration could make social communication easier. These findings suggest that bench geometry may influence the physical conditions associated with face-to-face communication. However, because the study used a relatively small, locally selected sample and did not experimentally compare the two bench types under controlled conditions, the findings should be considered preliminary.

Keywords: ergonomic design; public benches; C-shaped bench; social communication; proxemics; public space; anthropometry

1. Introduction

Public spaces such as parks, school yards, museums, and pedestrian areas serve multiple social functions. In addition to providing opportunities for rest, they create environments in which people meet, communicate, and spend time together. Consequently, the physical design of public furniture can influence how people use these spaces.

Conventional public benches are frequently constructed as straight linear surfaces. Although this configuration provides a simple and space-efficient seating solution, it places users along the same line and generally directs their bodies toward the same orientation. When several people sit on the same bench, users positioned at opposite ends may have limited direct visual contact. Maintaining a conversation may therefore require users to rotate their heads or upper bodies toward one another.

The relationship between physical space and interpersonal interaction has been examined within the field of proxemics. Hall described proxemics as the study of how people perceive and use interpersonal space. Anthropometric principles are also important in furniture design because the dimensions and geometry of furniture should correspond to human body dimensions and movement requirements.

The present study therefore explores a C-shaped, or half-moon-shaped, bench as an alternative configuration for public spaces. Unlike a conventional straight bench, the proposed design positions users along an arc, potentially allowing them to maintain greater visual contact during group conversations.

The aim of this study was to develop and preliminarily evaluate an ergonomically oriented C-shaped bench design intended to improve the conditions for social communication in public spaces.

The specific objectives were: (1) to identify potential communication-related disadvantages of conventional straight benches; (2) to examine the relationship between seating geometry and interpersonal positioning; (3) to develop proposed ergonomic dimensions for a C-shaped bench for three to four users; and (4) to conduct observations and a local survey to obtain preliminary evidence regarding the proposed design.

The research hypothesis was that changing the seating configuration from a straight line to a C-shaped arrangement would provide more favorable conditions for face-to-face communication and perceived communication comfort.

2. Materials and Methods

2.1. Study design

The study used a preliminary mixed observational and descriptive design consisting of four components: ergonomic and spatial analysis, development of a C-shaped bench concept, observation of users on conventional straight benches, and a survey of residents and students. The study was conducted in Buvayda District, Fergana Region, Uzbekistan, in 2026.

2.2. Ergonomic and spatial analysis

The existing straight-line bench configuration was analyzed in relation to the position of people sitting in groups. Particular attention was given to visual contact between users and the amount of body rotation required when communicating with a person seated farther along the bench. The proposed C-shaped configuration was developed as a half-moon form intended to position users toward the center of the seating arrangement.

2.3. Proposed bench dimensions

Parameter	Proposed dimension
Seat height	42–45 cm
Seat depth	48–50 cm
Backrest height	42 cm
Backrest angle	102–105°
Outer radius	1.7 m
Inner radius	1.2 m
Arc angle	120°

The proposed design was intended for three to four users and was based on the dimensions recorded in the original research.

2.4. School-yard observation

Students using conventional straight benches in the school yard were observed during communication. The observation focused on group seating and the duration of conversations. According to the original research record, groups of three students were observed, and conversations typically lasted approximately 10–15 minutes when users were seated on a straight bench.

2.5. Survey

A survey was conducted among 65 residents and students. The survey addressed the perceived comfort of prolonged communication on conventional straight benches and the potential usefulness of a C-shaped seating arrangement. The original research reports that 57 of the 65 respondents indicated that prolonged communication on straight benches was uncomfortable and that communication could become easier with a C-shaped arrangement.

2.6. Data analysis

Survey responses were summarized using descriptive frequencies and percentages. Of the 65 respondents, 57 provided the reported positive response. This corresponds to 87.7% of the surveyed group. No inferential statistical test was reported in the original study; therefore, no claim of statistical significance is made.

3. Results

3.1. Ergonomic design

The analysis resulted in a C-shaped bench concept intended for three to four users. The proposed configuration incorporated a 120° seating arc, an outer radius of 1.7 m, and an inner radius of 1.2 m. The seat height was specified as 42–45 cm, with a seat depth of 48–50 cm and a backrest height of 42 cm.

3.2. Observation of conventional straight benches

The school-yard observation indicated that three students seated on a straight bench generally communicated for approximately 10–15 minutes. According to the original observation, users experienced discomfort associated with turning toward conversation partners, particularly when those partners were not seated immediately adjacent to them.

3.3. Survey results

A total of 65 residents and students participated in the survey. Of these respondents, 57 reported that prolonged communication on conventional straight benches was uncomfortable and indicated that a C-shaped arrangement could make social communication easier. Thus, $57/65 \times 100 = 87.7\%$. The remaining 8 respondents represented approximately 12.3% of the surveyed group.

3.4. Visual documentation

The following images were included based on data collected during the study in the school courtyard.

BG Pulse Journal USA
ISSN:1947-2536 http://www.bgpulseusa.com/index.php/bg
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Figure 1. Visual material reproduced from the original research document.

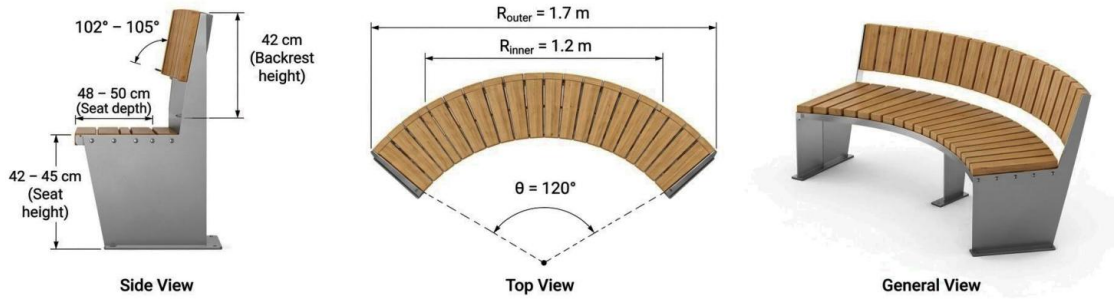


Figure 2. Visual materials related to the C-shaped bench design.



Figure 3. Visual materials related to the survey.

4. Discussion

The purpose of this study was to explore whether the geometry of public seating could be designed to provide more favorable conditions for social communication. The findings provide preliminary support for the idea that seating orientation is an important design consideration in addition to basic sitting comfort.

The most notable feature of the proposed C-shaped bench is its spatial orientation. A straight bench places users along a single linear axis, whereas a curved bench changes the relative orientation of the users. In a group conversation, this arrangement can make it easier for participants to maintain visual contact without continuously turning toward one another.

This finding is conceptually consistent with Hall's work on proxemics, which emphasizes the role of interpersonal distance and spatial organization in human interaction. The present design applies this general principle to public seating by treating the arrangement of people in relation to one another as part of the furniture-design problem.

The proposed dimensions also reflect the importance of anthropometric considerations in furniture design. Panero and Zelnik describe anthropometric data as an important tool for designing spaces and objects that accommodate human dimensions.

The survey result provides additional preliminary evidence supporting further investigation. A substantial majority of respondents—57 out of 65—reported discomfort with prolonged conversation on straight benches and considered a C-shaped form potentially easier for communication. However, this result should be interpreted cautiously because the survey measured respondents' perceptions rather than objectively measured communication performance.

The school-yard observation similarly provides an initial indication rather than experimental evidence. The reported 10–15-minute communication duration was obtained from observation of students using straight benches, but the study did not include an equivalent controlled observation of students using the proposed C-shaped bench. Consequently, it is not possible to establish an experimentally measured difference between the two configurations.

Another limitation concerns the sample. The survey included 65 residents and students from the local research setting. The original study does not provide sufficient demographic or sampling information to establish whether this group represents the wider population. The findings should therefore not be generalized to all public-space users without additional research.

Future research should construct a physical prototype of the C-shaped bench and compare it directly with a conventional straight bench. Such a study could measure conversation duration, frequency of body rotation, visual-contact duration, perceived comfort, and user satisfaction under comparable conditions.

5. Conclusion

This study developed and preliminarily evaluated a C-shaped public bench designed to support both ergonomic sitting and face-to-face social communication. The proposed design uses a 120° seating arc and specified ergonomic dimensions for three to four users. Observations of conventional straight benches suggested that group communication may be affected by limited face-to-face orientation and the need for body rotation. In the survey of 65 residents and students, 57 respondents (87.7%) reported that prolonged communication on straight benches was uncomfortable and indicated that a C-shaped arrangement could facilitate communication.

The findings provide preliminary support for further investigation of curved seating arrangements in public spaces. However, the current evidence does not establish a causal effect of C-shaped benches on communication comfort or duration. Controlled comparative experiments with larger and more diverse samples are required before stronger conclusions can be drawn.

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