A STUDY OF

THE CORRELATION BETWEEN BOUNDARY AND WILL OF FITNESS

OF **BEIJING NATIONAL FITNESS ROUTES**

IN THE CONTEXT OF PREVENTION AND CONTROL OF COVID-19

LIU Pinghao, SUN Peixu

Beijing University of Civil Engineering and Architecture, China

Email: Liupinghao@bucea.edu.cn

Key words

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CHINA "NATIONAL FITNESS ROUTE"

MOST POPULAR FITNESS SPACE IN ENCLOSE COMMUNITIES - FORGOTTEN, IGNORED, MISUSED

In China, the “enclosed” style community is the main form of mass habitation. With its clear boundary, a self-sufficiency life circle is formed. With the emergence of COVID-19, these enclosed communities have become the minimum isolation unit of people, and thanks to its clear boundary, the spread of COVID-19 has been greatly slowed or even interrupted.

However, COVID-19 has still changed the lifestyle of people. The “work from home” mode gradually became popular, and physical activities have been greatly reduced, including fitness exercises. More than this, gyms, fitness centers, and other kinds of fitness institutions have been temporarily closed or reduced their service time. Although home exercise is still possible, people are still eager to meet their needs for fitness through professional equipment. Therefore, the “National Fitness Route”, a Chinese special kind of fitness space inside the community, has recently become the most popular space for mass exercise.

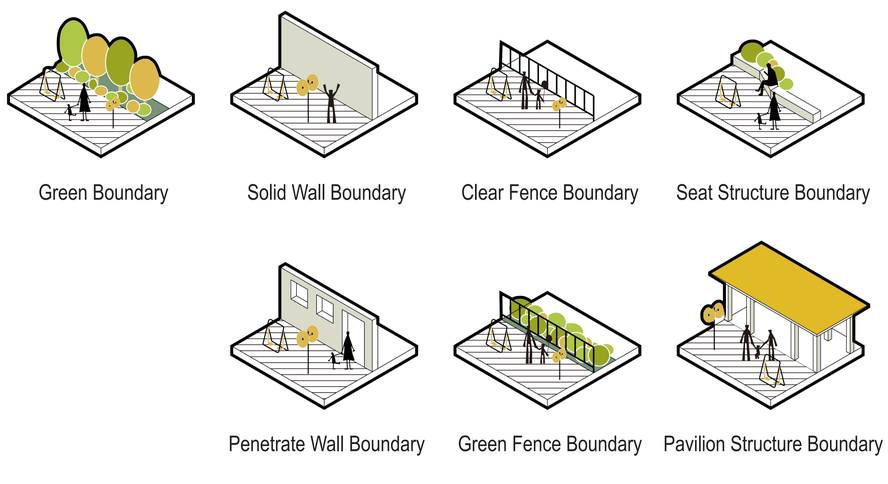
The “National Fitness Route” was conceived in the Outline of the National Fitness Program in 1995. In 1997, the China General Administration of Sport used 60% of the sports lottery public welfare funds to build the National Fitness Routes. With the support of policies and funds, “National Fitness Route” has become the largest and most widely distributed public fitness space type. Although they are outdoor fitness equipment, which is relatively small in size and have fewer kinds than indoor gyms and fitness centers, they appear in nearly every enclosed community in the big cities of China, which could fulfill the basic need for fitness and sport in the community.

However, due to the difference in construction time, the quality of these fitness spaces is different. Some need to be updated urgently. Some are located in the wrong place. Some are occupied by un-ordered parking. All the above make the National Fitness Routes in the communities forgotten, ignored, and misused by the public. Its potential is not fully exploited.

National Fitness Routes Status Quo in Xicheng District, Beijing

Boundary Modes

GREEN BOUNDARY | **WALL BOUNDARY** | **FENCE BOUNDARY** | **STRUCTURE BOUNDARY**



Fitness Route Area | Solid Wall Boundary | Clear Fence Boundary | Seat Structure Boundary

Green Boundary | Penetrable Wall Boundary | Green Fence Boundary | Pavilion Structure Boundary

Boundary State Quo

Green Boundary | Solid Wall Boundary | Clear Fence Boundary | Seat Structure Boundary

Penetrable Wall Boundary | Green Fence Boundary | Pavilion Structure Boundary

Boundary Data

CHINA
NATIONAL FITNESS ROUTE

as a special kind of PUBLIC SPACE OPEN SPACE

as a kind of PUBLIC SPORT FACILITY

BOUNDARY ? ***WILL OF FITNESS***

BOUNDARY 4 MODES?

With field research and case study and analysis, 4 boundary modes are concluded: Wall Boundary, Green boundary, Fence Boundary, and Structure boundary.

Wall Boundary is a hard division. View and behavior contact is blocked. It has 2 types: solid wall and penetrable wall.

Green boundary is a soft division made up of arbors, bushes, and other green plants. The view can easily cross the boundary. Behavior can also penetrate.

Fence Boundary is a soft division. The view can easily cross while the behavior is blocked. It has 2 types: clear fence and green fence.

Structure boundary is a special mode that makes the boundary not only a division but also a space for activity. It has 2 types: seat structure and pavilion structure.

BOUNDARY STATE QUO?

With 4 boundary modes, we redraw the detailed plan of each “National Fitness Route” and classify the boundaries. Through marking the different modes and types with different colors, we can easily read the distribution of boundary modes and draw several conclusions.

1) overall, as to the boundaries of all 52 cases, the majority mode is green. Like No. 302 and 303, the fitness routes are all surrounded by plants. Like No. 210 and 309, they are both surrounded by plants and walls, however, plants dominate.

2) nearly half of fitness routes do not have a whole boundary in all directions. Some even have a clear boundary in only one direction, which leads to space directly facing roads or parking and brings no sense of safety.

3) most cases are not surrounded by only one boundary mode but combined by 2-3 modes. No. 101 and 115 are combinations of green and green fence boundary modes. No. 212 is a combination of green, seats, and green fence boundary modes.

BOUNDARY DATA?

From the detailed plan, we can only read some general impressions of the distribution of boundary modes. As to the deeper study of the correlation between boundary and will of fitness, we must use scientific methods. Therefore, all the boundary mode information should be transferred to data.

We calculate the detailed length of each boundary mode of every “National Fitness Route” case. However, because of the different scales, we cannot compare the boundary length directly with each other. So, we transfer the length into percentages and present these data by doughnut chart.

From the charts, we can read clearly and directly not only the different boundary modes and their proportion but also the “blank” boundary and its proportion, which has a great influence on space's sense of safety.

FIELD RESEARCH?

Our study focuses on the public space in our real life and through firsthand experience, more situations and status quo are gained. The field research has 3 steps as below.

1) General experience: we go through over 100 “National Fitness Routes” in 3 Neighborhoods (Zhanlanguan, Yuetan, and Xinjiekou) of Xicheng District one by one to check the existence and location of each fitness route from the official database. With the general experience gained, we choose 52 cases for further study.

2) Plan drawing: more spatial information is recorded through plan drawing, including the location and catalogs of plants, the location of fitness facility, the location, and type of lighting, the location of parking, etc.

3) Activity information: the activities inside the fitness routes are recorded. The activity information includes the age, the health condition, etc. of people training inside, fitness events, etc.

QUESTIONNAIRE SURVEY?

Unlike all the physical information above gained, the will of fitness is a subjective evaluation that cannot be measured only by field research. Therefore, as for the will of fitness of each fitness route, the evaluation has 2 phases.

Phase 1: Subjects Rating: 30 subjects are invited to go through 52 fitness routes and rate. 3 aspects of vitality, stabilization, and orderliness are considered. This will firstly bring a basic rating to a consistent standard.

Phase 2: Mass Grading: over 250 questionaries are delivered. Participants are asked to see the real photo of one fitness route and answer whether they want to exercise here. “Very unlike” score 0, while “Very like” score 5. Each questionary includes 10 out of 52 cases. With these questionaries, we can get the average score of each fitness route (out of 10). With the rates and scores getting from these 2 phases above, we combine them and get the final evaluation of these 52 cases.

MLR

MULTIPLE LINEAR REGRESSION

From the study of the boundary, we get the detailed boundary data of each fitness route. From the study of will of fitness, we get the evaluation score of each. Then, multiply linear regression is implemented between these 2 sets of numbers.

From the table and charts from SPSS, we can draw the basic conclusion that the two are correlated. (R square>0.3 and Adjust R square>0.3)

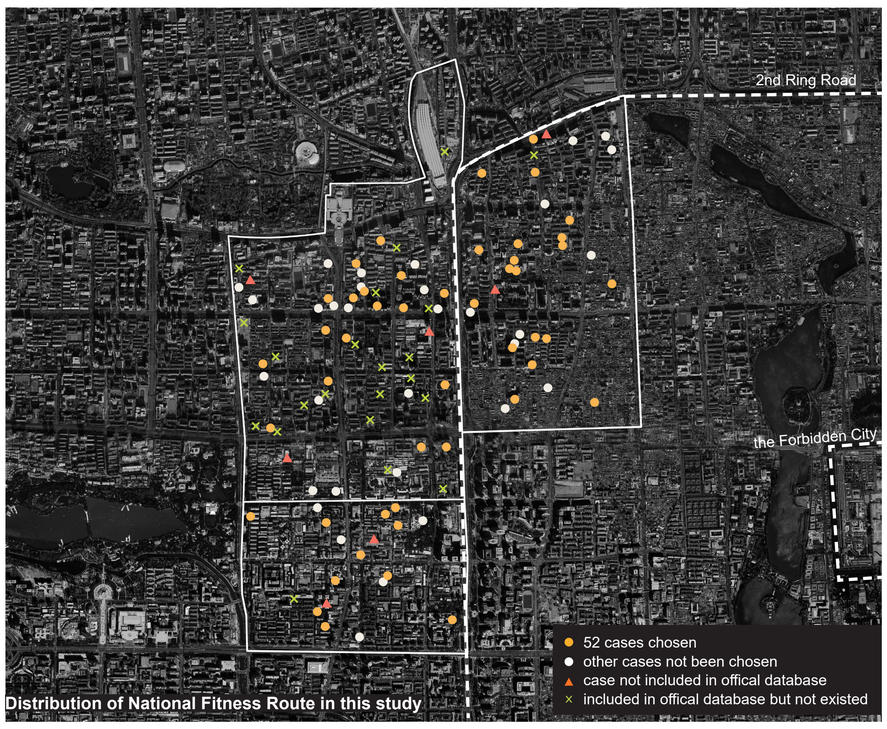
CORRELATION BETWEEN BOUNDARY AND WILL OF FITNESS

From the formula, we can draw more conclusions about the correlation between the boundary and the will of fitness.

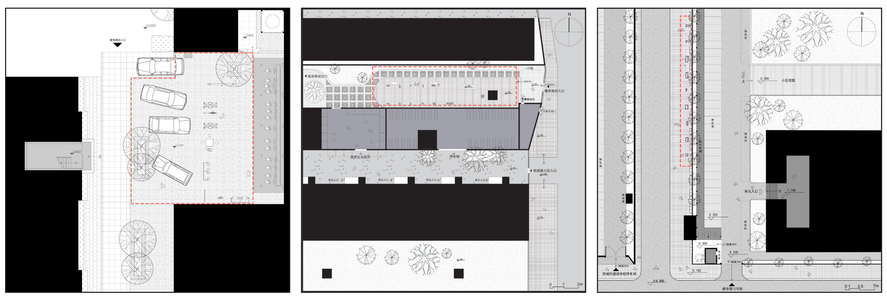
1) as all the coefficients are above 0, the increase of total boundary length can increase the will of fitness. It means less the blank boundary, more the will of fitness.

2) among the 7 boundary modes , Green Boundary has the biggest coefficient (see Standardized Coefficient), which means it has the greatest positive influence on the will of fitness. The secondary is Green Fences.

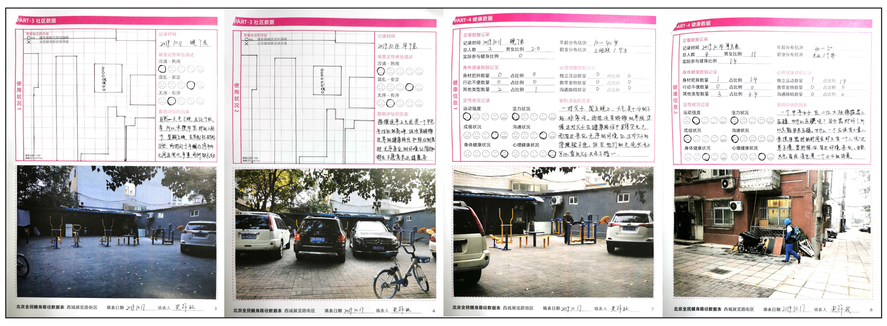
3) Appropriate transparency of the boundary can motivate the will of fitness. However, too transparent or too solid would weaken it.



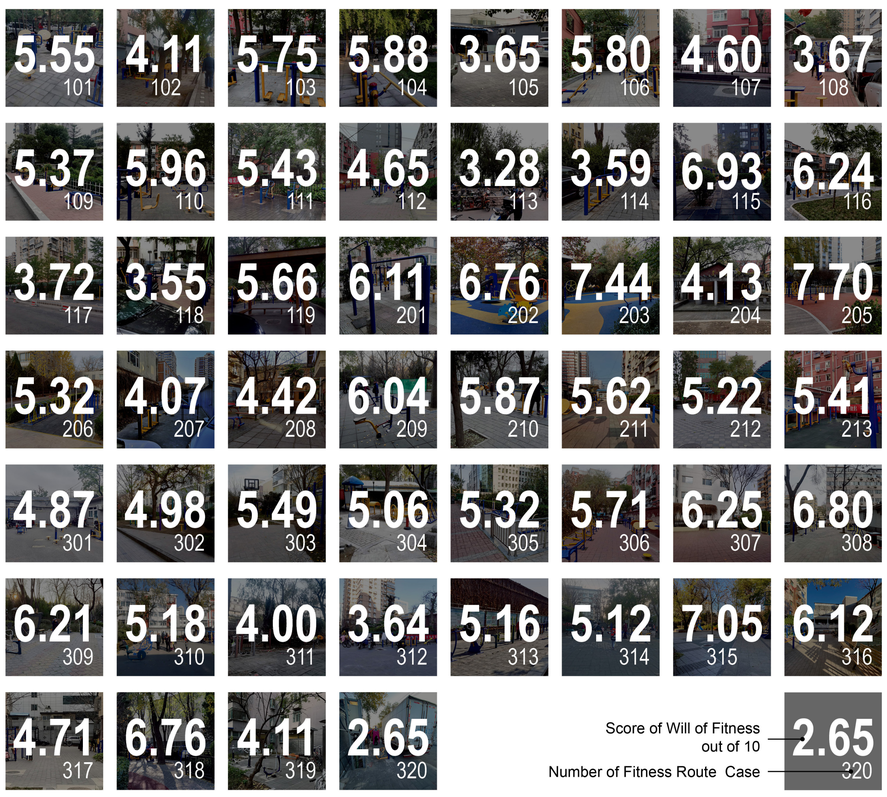
Distribution of National Fitness Route in this study



Detailed Plan Drawing



Activity Information Recording



Score of Will of Fitness out of 10 — 2.65

Number of Fitness Route Case — 320

Will of Fitness Evaluation

Model Summary output by SPSS

	R	R Square	Adjusted R square	Std. Error of the Estimate	Durbin-Watson
acceptable range		>0.3			1.9-2.1
Model	0.705	0.497	0.417	0.87245	2.040

Coefficients output by SPSS

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(constant)	2.907	0.500		5.818	0.000		
Green Boundary	3.964	0.697	0.973	5.685	0.000	0.390	2.562
Solid Wall Boundary	1.954	0.925	0.297	2.113	0.040	0.578	1.730
Penetrable Wall Boundary	2.045	1.298	0.220	1.575	0.122	0.587	1.703
Clear Fence Boundary	2.944	0.724	0.527	4.064	0.000	0.680	1.471
Green Fence Bounday	3.457	0.764	0.738	4.525	0.000	0.430	2.328
Seat Structure Boundary	2.169	0.742	0.451	2.926	0.005	0.480	2.082
Pavilion Structure Boundary	4.059	1.308	0.408	3.103	0.003	0.660	1.516
acceptable range					<0.005		<10

$$W = 3.964 * Bg + 1.954 * Bsw + 2.045 * Bpw + 2.944 * Bcf + 3.457 * Bgf + 2.169 * Bss + 4.059 * Bps + 1.504$$

W - **Will of Fitness (out of 10)**

Bg - percent of Green Boundary (%)

Bsw - percent of Solid Wall Boundary (%)

Bpw - percent of Penetrable Wall Boundary (%)

Bcf - percent of Clear Fence Boundary (%)

Bgf - percent of Green Fence Boundary (%)

Bss - percent of Seat Structure Boundary (%)

Bps - percent of Pavilion Structure Boundary (%)