

Barriers and facilitators to bicycle use for transport and leisure among adults

Barreiras e facilitadores para o uso de bicicleta no deslocamento e no lazer entre adultos

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RESUMO

O objetivo do estudo foi identificar as principais barreiras e facilitadores para o uso da bicicleta no deslocamento e no lazer em adultos de Curitiba-PR. Quarenta e oito indivíduos adultos, de ambos os sexos e que apresentavam características distintas em relação ao uso da bicicleta (deslocamento, no tempo de lazer e ativistas) participaram de entrevistas em grupos focais. A análise de conteúdo foi utilizada para agrupar os relatos semelhantes, posteriormente descritos de acordo com a distribuição de frequência absoluta e relativa. As barreiras mais citadas foram “falta de segurança” (46 relatos; 20%) e “falta de ciclovias” (29 relatos; 12,6%), enquanto os facilitadores reportados com maior frequência foram “bem estar” (35 relatos; 20,2%), presença de “estruturas adequadas” (18 relatos; 10,6%), “apoio da família” (18 relatos; 10,6%) e “presença de companhia em geral” (17 relatos; 10%). Aspectos sociais e ambientais, como segurança pública, atividades em grupos e melhoria das estruturas para o uso da bicicleta devem ser consideradas na elaboração de programas para incentivo a sua utilização.

PALAVRAS-CHAVE

Atividade física; Atividade motora; Determinantes; Grupos focais; Políticas públicas.

ABSTRACT

The aim of the study was to identify the main barriers and facilitators to the use of bicycles for transportation and leisure in adults from Curitiba, Brazil. Forty-eight adults of both sexes and presenting distinct characteristics related to cycling (commute, leisure time users and activists) participated in focus groups interviews. The content analysis was used to group similar reports later described according to absolute and relative frequencies distribution. The most reported barriers were “lack of safety” (46 reports, 20%) and “lack of bike lanes” (29 reports, 12.6%), while the most frequently reported facilitators were “well being” (35 reports, 20.2%), presence of “adequate structures” (18 reports, 10.6%), “family support” (18 reports, 10.6%) and “presence of company in general” (17 reports, 10%). Social and environmental aspects such as public safety, group activities and improving infrastructure for bicycle use should be considered in developing programs to encourage its use.

KEYWORDS

Physical activity; Motor activity; Determinants; Focus groups; Public policy.

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INTRODUCTION

It is estimated that physical inactivity is responsible for 10% of deaths from cardiovascular disease, diabetes and some cancers worldwide, which represents a high cost to public health systems¹. Despite this negative impact, less than 30% of the adult population engages in physical activity (PA) in levels recommended for health benefits².

Encouraging the use of bicycles can be an important alternative to promote PA in commuting and leisure³⁻⁷. However, bicycle use is more common in high-income countries than in those of middle-income, such as Brazil⁸. For example, while in Curitiba (Brazil), only 11 and 17% of the adult population uses a bicycle for commuting and leisure, respectively⁹, in countries with elevated income these values are higher (26% for leisure and 41% for commuting)^{3,10,11}.

Several factors may contribute to an individual's decision to use or not the bike, which explains, at least partially, the differences mentioned above. The factors that exert negative influences can be considered "barriers", while those that influence in a positive can be considered "facilitators"¹². The most common barriers reported in the literature are lack of adequate infrastructure (e.g. bike paths and bike lanes), perceived lack of safety (crime and traffic), lack of company and unfavorable weather^{3,13-15}. Although almost all of the studies have come from high-income countries, at one study in Brazil found that the main barriers to bicycle use among adults include the perception of heavy traffic, unfavorable weather and lack of safety¹⁶.

As part of a larger study on bicycle use a systematic search was performed in the main databases in the fields of health, psychology and commuting (PubMed, Science Direct, Web of Science, Lilacs and SciELO). However, studies on barriers and facilitators for bicycle use from low and middle-income countries have not been identified. In those situations in which the evidence is limited, focus groups may help to begin to unveil the complexity of a variety of behaviors (e.g. commuting, physical activity) by gathering deeper and detailed information as compared with the use of questionnaires.

There is a need to improve public acceptance regarding the use of the bicycle for which this behavior is seen as a common daily activity in urban centers. But for this it is necessary to study the environment in which the individual belongs, more than that, to know the barriers and facilitators that predict their behavior, calling attention to what you need to know before developing an intervention program. The aim of this study was to identify barriers and facilitators of the use of bicycles among adults from Curitiba, Brazil.

METHODS

Characteristics of the study

This study is characterized as exploratory with a cross-sectional design. The technique used was focus groups, to identify feelings, perceptions, attitudes and ideas of a group of bicycle user about barriers and facilitator to its use¹⁷. Despite the limited use of focus groups on PA studies in Brazil¹⁸, this technique has been previously used to analyze barriers do PA among adolescents¹⁹ and elderly Brazilians^{20,21}.

Participants

Participants were adults (18-65 yrs old) of both sexes, classified according to the main purpose of bicycle use, in one of the following categories: commuting, leisure and activists.

Participants in groups “commuting” and “leisure” were identified on an available database from the project E.S.P.A.Ç.O.S, conducted between August and December 2010, aiming to understand aspects of the PA practices in adults in the city of Curitiba, Brazil²². Individuals who reported the use of bicycles were contacted (phone, cell phone) and invited to participate in this study. The group “activists” was comprised of individuals who participated in groups and social movements related to bicycle use in the city. In this study, the term “activist” was defined as “a group of individuals engaged in actions and practices that claim to defend bicycle use in the urban context”²³. To locate these individuals a search was performed on social networks (Facebook and Orkut) and on Internet sites, as recommended on literature⁷. A search was conducted in several internet-based social media sources (e.g. Facebook, Orkut) to identify activists in the city of Curitiba. Those with following characteristics were invited to be part of the study: age between 18 to 65 years; meet other activists at least once per week to ride a bicycle. We also included volunteers from both genders.

Development of focus groups

The number of participants in each group was determined according to the literature recommendation¹⁷, which suggests a maximum of 12 people per focus group. Following this recommendation, 72 subjects were invited (12 in each one of the six groups). After the initial contact 48 individuals agreed to participate and have attended the meetings. The number of participants ranged between six and twelve per group (commuting, leisure and activists; men and women).

Thus, 72 subjects were invited (12 in each of the three groups), defined according to sex, to appear at a scheduled time and place. In the end, 48 individuals attended and agreed to participate in the research. The final number of participants in each group ranged from six (commute and leisure groups) to 12 individuals (activists group).

Data Collection

The interviews were conducted between the months of September and October 2011 and followed a script previously tested in a pilot study and conducted by a single researcher familiar with the technique (study researcher). The script included open questions and topics related to bicycle use. The focus groups interviews were occurred in three stages: a) introductions of the group mediator, participants and study objectives, b) presentation of topics on bicycle use, c) discussion with the aid of panels on the theme (the panels contained pictures of individuals using bicycle in several situations such as raining, during a sunny day, commuting and for leisure, etc.). The focus groups lasted two hours on average. The answers and discussions were videotaped and recorded by the researcher and at the end of each interview a manuscript containing observations and comments of the researcher was generated, along with an audio recording of the dialogues. The recording

was initiated with the permission of the participants and completed after the closing of the discussion. All discussions were conducted in a suitable room, sound proof, in the premises of the Pontifícia Universidade Católica do Paraná, Brazil (PUCPR).

The study was approved by the PUCPR Research Ethics Committee (5418/11) and individuals agreed to participate voluntarily in the study by signing an informed consent.

Data analysis

For data analysis the information gathered during the focus groups was transcribed to files assigning to each participant an identification code (P1, P2, P3, etc.) to maintain anonymity of participants. These files were then transferred to the software Atlas.ti 5.0. This software performs content analysis and allows categorization of variables according to a certain pattern of response, using predefined rules. For the purpose of this study the responses were categorized into two categories which were labeled according to their negative (barriers) or positive (facilitators) meaning¹². For example, report as: “... *the fact that there are no bike lanes makes bicycle use difficult, and lack of security.... I often quit out of fear*” and “...*when you have good company, it is possible bicycling anywhere*” were classified as barrier and facilitator, respectively. Then, barriers and facilitators were quantified and compared by sex and groups of participants (commute, leisure, activists) using absolute and relative frequencies.

RESULTS

After data extraction 400 reports were identified and among them 230 were classified as barriers and 170 were classified as facilitators (Tables 1 and 2, respectively). The most frequently reported barriers were “lack of safety” (46 reports, 20,0%) and “lack of bike lanes” (29 reports, 12.6%) (Table 1) and the least reported were “lack of awareness about the health benefits of bicycling- 3 reports, 1.3%) and “lack of awareness about the environmental (ecological) benefits of bicycling” (2 reports, 0.9%). Regarding sex, women reported as major barriers “lack of bike lanes” (24 reports - 22.9%) and “lack of safety” (23 reports - 21.9%). For men, barriers such as “lack of safety” (23 reports - 18.4%) and “lack of government support” (16 reports - 12.8%) were most reported. Among commuters, “lack of safety” (17 reports - 22.4%) and “inadequate weather “ (13 reports - 17.1%) were the two main barriers reported, while for users of bike for leisure, “low self efficacy” (12 reports – 20,0%) and “lack of bike lanes” (11 reports - 18.3%) were the most common. Finally, activists reported the main barriers as “lack of safety” (23 reports - 24.5%) and “lack of structure” (21 reports - 22.3%).

Overall, the most common facilitators reported were “well being” (35 reports, 20.6%), “adequate structure” and “family support” (18 reports, 10.6% each) and “having company in general” (17 reports; 10,0%) (Table 2). The facilitators less reported were “presence of bike lanes” and “proximity to destinations” (4 reports each, 2.4% each) and “support from the government” (3 reports, 1.8%). Facilitators most common reported by women were “well-being” (16 reports - 18.2%) and “having company” (15 reports – 17,0%), while for men the most common were “well-being” (19 reports - 23.2%) and

TABLE 1 – Absolute and relative frequencies of barriers to the use of bicycle stratified by sex and purpose of use. Curitiba-Brazil, 2011 (n=48).

Barriers	Commute (n=12)				Leisure(n=12)				Activists(n=24)				All(n=48)	
	Male (n=6)		Female (n=6)		Male (n=6)		Female (n=6)		Male (n=12)		Female (n=12)		n	%
	n	%	n	%	n	%	n	%	n	%	n	%		
Lack of safety (crime)	12	33.3	5	11.6	4	13.8	2	5.4	7	11.1	16	51.6	46	20.0
Lack of bike lanes	-	-	9	20.9	2	6.9	9	29.0	3	4.7	6	19.3	29	12.6
Inadequate weather	6	16.7	7	16.2	2	6.9	7	22.6	1	1.6	-	-	23	10.0
Lack of structure	-	-	1	2.3	-	-	-	-	15	23.8	6	19.3	22	9.6
Low self efficacy	-	-	8	18.6	6	20.7	6	19.3	-	-	-	-	20	8.7
Lack of government support	-	-	-	-	1	3.4	3	9.7	15	23.8	-	-	19	8.3
Lack of respect in traffic	1	2.8	1	2.3	6	20.7	1	3.3	6	9.5	3	9.7	18	7.8
Lack of access (traffic)	1	2.8	1	2.3	3	10.3	2	6.4	3	4.7	-	-	10	4.3
Lack of respect (insults)	-	-	3	6.9	-	-	1	3.3	4	6.3	-	-	8	3.5
Lack of parking	3	8.3	-	-	-	-	-	-	4	6.3	-	-	7	3.0
Lack of support from a companion	2	5.6	3	6.9	1	3.4	-	-	-	-	-	-	6	2.6
Lack of changing rooms	1	2.8	4	9.3	-	-	-	-	-	-	-	-	5	2.2
Lack of family support	2	5.6	1	2.3	1	3.4	-	-	-	-	-	-	4	1.7
Lack of support from friends	1	2.8	-	-	3	10.3	-	-	-	-	-	-	4	1.7
Financial economy	4	11.1	-	-	-	-	-	-	-	-	-	-	4	1.7
Lack of consciousness in general	-	-	-	-	-	-	-	-	3	4.7	-	-	3	1.3
Lack of ecological consciousness	-	-	-	-	-	-	-	-	2	3.2	-	-	2	0.9
Total	33	100.0	43	100.0	29	100.0	31	100.0	63	100.0	31	100.0	230	100.0

- no report

TABLE 2 – Absolute and relative frequencies of facilitators to the use of bicycle stratified by sex and purpose of use. Curitiba-Brazil, 2011 (n=48).

Facilitators	Commute (n=12)				Leisure(n=12)				Activists(n=24)				All(n=48)	
	Male (n=6)		Female (n=6)		Male (n=6)		Female (n=6)		Male (n=12)		Female (n=12)		n	%
	n	%	n	%	n	%	n	%	n	%	n	%		
Well being	5	16.1	3	18.7	3	21.4	8	24.2	11	29.7	5	12.8	35	20.6
Adequate structure	-	-	-	-	-	-	7	21.2	4	10.8	7	17.9	18	10.6
Family support	5	16.1	5	31.2	1	7.1	-	-	4	10.8	3	7.7	18	10.6
Company in general	2	6.4	3	18.7	-	-	4	12.1	-	-	8	20.5	17	10.0
High self efficacy	3	9.7	1	6.3	-	-	4	12.1	-	-	4	10.2	12	7.1
Contact with nature	3	9.7	-	-	2	14.3	3	9.1	2	5.4	-	-	10	5.9
Companion support	6	19.3	1	6.3	1	7.1	1	3	-	-	-	-	9	5.3
Parking available	2	6.4	-	-	-	-	1	3	4	10.8	2	5.1	9	5.3
Safety (crime)	-	-	-	-	1	7.1	1	3	-	-	6	15.4	8	4.7
Adequate access (traffic)	-	-	-	-	2	14.3	3	9.1	2	5.4	-	-	7	4.1
Ecological consciousness	-	-	-	-	1	7.1	-	-	2	5.4	4	10.2	7	4.1
Changing rooms available	1	3.2	1	6.3	-	-	-	-	3	8.1	-	-	5	2.9
Support from friends	2	6.4	-	-	1	7.1	-	-	1	2.7	-	-	4	2.4
Proximity of destinations	2	6.4	2	12.5	-	-	-	-	-	-	-	-	4	2.4
Bike lanes available	-	-	-	-	2	14.3	1	3	1	2.7	-	-	4	2.4
Support from municipality/ government	-	-	-	-	-	-	-	-	3	8.1	-	-	3	1.8
Total	31	100.0	16	100.0	14	100.0	33	100.0	37	100.0	39	100.0	170	100.0

- no report

“family support” (10 reports - 12.2%). Among groups, commuters reported that “family support” (10 reports - 21.3%) and “well-being” (8 reports - 17,0%) were the main facilitators, while for those who use of bike for leisure, “well-being” (11 reports - 23.4%) and “adequate structure” (7 reports - 14.9%) were the most important. Finally, activists reported “well being” (16 reports - 21.1%) and “presence of structure” (11 reports - 14.5%) as facilitators.

DISCUSSION

This is the first study to identify the barriers and facilitators to the use of bicycle in Brazilian adults using focus groups. This method allows us to identify the feelings and stories of individuals who often cannot be identified in studies using structured questionnaires and closed answers¹⁷. Such information is important for the success of interventions in public policy, which depends on prior knowledge of the reality of community problems^{14,24}. The main barriers identified were “lack of safety” and “lack of bike lanes”, for example, individuals reported that *“...I use over the weekend, it is safer to walk in the parks that have police. In everyday life you cannot use, the number of assaults, robberies is huge ... we are at danger...”* (P 15, male who uses the bike for leisure) and that *“The bike paths are not interconnected and the few that are, have a bad structure...”* (P 5, male activist). The main facilitators were “well being”, “adequate structure”, “family support” and “having company in general”, for example, individuals reports that *“I always dreamed of riding a bike as a child it was my dream of consumption, but my parents never let me ride. They said it was a boy thing...”* (P 1, women activist) and that *“Cycling for me is a personal accomplishment”; and “For me, bicycling means feeling well, it’s part of my well-being”. I suffered a lot in my adolescence, because my parents would not let me go out in the street to ride the bike, today I am free. I got my independence”* (P 6, female activist).

Mosquera *et al.*²⁷ interviewed 31 men and 13 women in Bogotá, Colombia, and found that women reported barriers more frequently than men. In that study, barriers were “lack of safety”, “lack of connectivity between bike lanes” and “limited number of bike lanes throughout the city”²⁵. In our research, individuals reported *“...when I was a kid it seemed that it was safer, my parents let us ride in the street even at night, today I’m afraid to let my children go to school riding the bike...”* (P 2, female activist). Ahlport *et al.*²⁴ interviewed 37 parents in North Carolina, United States (U.S), and found that the main barriers for children to bicycle use in commuting to school were “crime” and “inadequate streets” (lack of connectivity between bike lanes and the streets). In a study Fishman *et al.*²⁶ showed that the “lack of structure” and “bad driver behavior” were the most frequently reported barriers by 18 adults on the use of public bicycles in the city of Brisbane, Australia. In our research, individuals reported *“...the bike rider is not respected in the streets, drivers are very reckless. Do not respect cyclists”* (P 11, male activist).

These results are similar with the findings of this study. In fact, “lack of safety” and “poor quality of bike lanes” were the most common reports on bicycle use. For example, individuals reported that *“...the bike lanes are damaged, it is necessary to maintain and more than that, so extend the connections...”* (P 15, male who uses the bike for leisure) and that *“I’m not allowing my wife to ride*

a bike these days, she takes the risk of being mugged, raped...” (P 6, male activist). Despite these reports, studies that tested the association between perceived neighborhood characteristics²⁶ and perception of barriers¹⁶ found no association of these variables and the use of bicycle in adults.

Other studies were conducted in cities and states of the U.S. (Boston, San Diego and Cincinnati¹⁴ and North Carolina¹⁵ and Europe (Graz-Austria¹⁰, Bruxelles-Belgium²⁷, Leinden-Holland³, Valência-Spain¹³, with the use of structured questionnaires with residents of those locations^{10,14,15,27} and in specific population groups, such as university students¹³ and workers³. In these studies, the main barriers reported were the “lack of connectivity of bike lanes”, “lack of adequate facilities for bicycles” (parking and changing rooms) and “lack of social support”. A survey conducted in Curitiba, Brazil found reports similar with the present study (e.g. barriers), being “heavy traffic”, “unfavorable weather” and “lack of safety” (crime) reported the most¹⁶. Also in Curitiba, Brazil about 15 and 63% of the population reported unsafe for walking/bicycling in their neighborhoods during the day and night, respectively²⁶. In fact, the high perception of unsafe can hinder the use of bikes. However, this feature was not associated with the use of the bicycle in commuting²⁶. In our research, individuals reported “...*Nowadays it is dangerous to ride a bike day and night. Women and children have to be extra careful*” (P 9, male activist).

The most common cited facilitators in this study were “well being”, “adequate structure” and “family support” as evidenced by the reports “...*I started using a bike after I got married, because my husband encourages me ...*” (P 3, female who uses the bike in commuting) and “...*I feel good riding, I feel that I take care of my health, and I'm glad to feel the wind on my face, the feeling of freedom ...*” (P 4, male who uses the bike for leisure).

In Bogotá, Colômbia²⁵, found that the facilitators for bicycle use were related to “health benefits” and “well being.” Women tend to recognize the aesthetic benefits (physical appearance and weight control) more than men, who report improved physical ability and sense of freedom²⁵. These findings are similar to those from high-income countries, where the main facilitators reported by adults were “perceived benefits”, “social support” and “facilities for bicycles”^{3,10,24,27}. Ahlport *et al*²⁴ found that the main facilitators for parents to allow their children to use their bicycles in commuting to school were “perceived benefits”, “security”, “adequate structure at school and on the route to school” (policing, bike lanes, parking at school). De Geus *et al*⁵ found that “connectivity of bike lanes”, “social support” and “perceived benefits” were positively associated with bicycle use in adults. Similar results were found in residents of Graz, Austria¹⁰ and workers in Leinden-Holland³. Fishman *et al*.²⁶ found that “having company” and “traffic safety” were considered the main facilitators reported by adults to bicycle use.

In general, facilitators found in high-income countries seem more related to “perceived benefits”, “support from family and friends”, “own safety” and “facilities for bicycles.” With the exception of “perceived benefits”, the lack of other reasons is found as barrier both in high-income countries as in this study^{3,10,24,28}. This shows that strategies to increase bicycle use should consider, besides improvement of roads and the physical environment in general, aspects of the social environment such as support from family and friends. In accordance with the current findings, in Curitiba, Brazil, the use of bicycle

is positively associated only with individual variables such as male gender, younger age, lower socioeconomic status, ownership of bicycle, perception of quality of life and meet the recommendations to PA practice¹⁶. The perceived environment variables were not associated with the use of bicycle²⁶. In contrast, the documents and reports used to develop the Bicycling Mobility Plan define that in order to increase the use of bicycles in the community it is necessary the construction of bike paths and bike lanes, particularly in the areas of rapid urban expansion²⁹.

Some positive aspects of this study include the fact that the focus groups were conducted separately for men and women and according to the type of bicycle use, providing relevant information to each of these characteristics. Moreover, commuters and users of bicycle for leisure were identified from a study conducted with the city's population²². However, certain characteristics must be considered when interpreting the results. First, the groups were not selected in order to ensure heterogeneity of income and education, which may partly explain the high number of reports associated with structural (e.g. bike lanes) and social barriers. Although the protocol has been previously tested and employing focus groups is considered useful for understanding aspects of subjective opinions, it is possible that more "socially" acceptable opinions might have dominated the discussions. Therefore, one must consider that individuals who are more dominants may have inhibited the discussion in some groups. Finally, the activists had higher participation than the other groups, which increased the total number of reports from this group.

In conclusion, "lack of safety" and "lack of bike lanes" were the most reported barriers to the use of bicycles, while presence of "well being", "adequate facilities", and "family support" and "presence of company in general" was the main facilitators. Programs to encourage bicycle use should incorporate the findings of this study to improve in aspects of public safety and infrastructure by implementing new exclusive lanes (bike paths and lanes). These findings should also be incorporated in policies aiming to create and modify environments that are conducive for PA²⁹. Also, group activities that enable the participation of friends and family should be included. Studies in large populations similar to the present study may incorporate the findings of this research in its measures. Finally, future studies should examine to what extent social and environmental changes can encourage the use of bicycles as a means of transportation or for leisure.

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Contribution of authors

EC Camargo was responsible for the initial of literature review, collected, analysis and interpretation of data and drafting the text. RC Fermino collaborated on the literature review, interpretation of results, drafting and revision of the text in all stages. CR Rodriguez Añez collaborated on the critical review of the manuscript. RS Reis collaborated on the study design, supervised the collection and analysis of data, and critical revision of the text. All the authors read approved the final version of the manuscript.

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