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## Access of wheelchair users in sportive mega events: the case of Confederation Cup

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### Abstract

This article aims to evaluate the Access conditions for wheelchair users in sporting mega-events. It will show the characterization of some attributes related with the walk, as the variables that express them, showing the studied group particularities. The data collect was made in June, 2013 by questionnaire application during the competitions of The World Confederation Cup realized in Rio de Janeiro on the Maracanã Stadium. This paper establishes the principal attributes identified based on the literature review and the exploratory field research, signaling the satisfaction with the security and comfort attributes, and also the main infrastructural problems at surroundings, that are the ramps leveling the streets to the sidewalks and the flowerbeds along of the public footpaths. Reinforcing the necessity of rethink the planning of the public spaces focusing in the Universal Design, but contemplating explicitly the studied group perceptions by the Service Quality concept.

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### 1. Introduction

Holding sporting events on an international stage notably gives the host city the responsibility to provide a safe and enjoyable experience for spectators who come to attend the game (in itself) as well as enjoy the peripheral

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elements, be they at the stadium or in its surroundings (Theodorakis *et al*, 2013).

Moreover, so-called mega sporting events represent an opportunity for local transformation, due to incoming investments linked to such activities. The allocation of these resources can contribute to cities becoming both better-structured and more attractive, or at the very least meeting the requirements of the International Olympic Committee (promoting specific changes). It is worth noting in this case, the concern with creating environments that meet the diversity of individuals who reside in or visit the city in question. In this context, it is worth mentioning the example of the city of Barcelona where, according to Cohen (2006), the 1992 Summer Olympic and Paralympic Games had a special significance in the struggle for the rights of Persons with Disabilities - DP. According to the author, nowadays, it is an inclusive city, signaling that events of this size can mean substantial change in the urban territory.

The DP are, generally speaking, those who have some limitation which may cause set-backs in performing one or more daily practices. These can be physical, intellectual, sensory or multiple order and, in turn, directly impact the infrastructure and social conditions in which these individuals are live. Thus, expanding the notion of disability beyond the body and incorporating an individual's surroundings (U.S. Department of Justice, 2010; Brazil 2001 *apud* Cosenza & Resende, 2006). According to the World Health Organization - WHO (2011), there are more than 1 billion people in the world with some form of disability, about 200 million of whom have severe functional difficulties. Within this scope, this work will concentrate on a specific group within the DP, that being wheelchair users (chosen for being the most affected by what could restrict getting from one place to another). According to the Census (2010), 23.91% of the Brazilian population is said to have some type of disability, while 0.39% are considered permanently physically disabled (defined as: an individual who, "...cannot in any way, " or who is, "permanently unable, because of physical disability, to walk and/or climb stairs without the help of another person" [IBGE, 2010]). The values presented show the necessity of measures being taken, beyond emergency situations, to give the disabled access to both cultural and leisure activities in everyday city life.

With the goal of creating inclusive spaces, there emerged in the United States of America, in 1985, a philosophy of "Universal Design" with the purpose of creating environments to be egalitarian, adaptable, obvious, known, safe, inclusive and effortless. Thus, for all people and respecting their differences, according to the vision brought about inclusion in this study (Pinto, 2012; Fonseca & Silva, 2010). And, with the aim of coming close to this group's expectation (with specific needs that usually are considered through technical manuals), this approach to the service quality proves interesting, since it considers the opinions of users to indicate the main focus of carrying out and proposing measures. Cardoso (2012, p 17) citing Portugal (1980) considers that:

"The service quality is an overall measure of all characteristics of service, whose perception of the system is made by the user. The perception and the consideration of its attributes vary according to socio-economic and locational characteristics and the purpose of the trip."

The service quality is expressed in dimensions pertaining to the service offered, and these dimensions are given their own attributes. It is believed that these boundaries, along the knowledge of their impact on how a DP gets around, can be used as a functional tool for urban planning, reducing the space between users and planners, and bringing about the creation of actually inclusive environments.

The City of Rio de Janeiro, where this research is being conducted, will receive two of the most important sporting events: The World Cup Soccer FIFA 2014 and the 2016 Olympic and Paralympic Summer Games. With this in mind, this work intends to define some attributes of the mobility of wheelchair users.

Therefore, the research performed has been divided into two main parts: a) the bibliographical research; b) questionnaires about the infrastructure around the Maracanã stadium. Its application was achieved on location during the three games of the FIFA Cup of the Confederations – held in the Maracanã – and, posteriorly, via email from contacts made while the event was occurring.

The literature review related to walking environments were taken into account focusing on those using wheelchairs - without failing to consider, however, pedestrians (where the discussion about the service quality is at a more advanced level). In this way, it was possible to know the relevant attributes to wheelchair users, defining what importance the attributes have for them. This contribution is meant to motivate art and stimulate measures which

bring together users of urban planning and management.

## 2. Perceived characteristics of wheelchair users: A Review

During the survey of the main references about wheelchair users in Brazil, there was some perceived concern in providing universal access - both in legislation and in technical manuals. The same observed in other countries such as the United States, for example, where, beginning with the American with Disabilities Act (1990), several manuals began to be developed (USA Department of Justice, 2010a, 2010b, 2009a, and 2009b). However, few studies have considered the importance of the opinion/participation of these individuals in the investigation of the quality of their mobility. The approach rooted in the individual experiences of the group is still in the embryonic stage. Some important studies have sparked discussion (Ferreira & Sanches, 2012; Keppe Jr., 2008), but nevertheless, there are still many gaps to be filled. Studies such as these most commonly focus on public transportation or individual transport as objects of analysis (Cardoso, 2012; Dell'Olio *et al.*, 2011). Taking into account these setbacks, in this item will be considered works that although not intended as part of group studies, address qualities or variables that can be considered here.

In studies developed focusing on pedestrians, the practice of consulting users (via internet, telephone or personal contact) demonstrates the importance of having a closer relationship with said user, starting with methods applicable to planning. Considering that the experiences reflect in schools and given that they are intangible and non-transferable, it is said that it is really only possible to comprehend the motivations of a given group when there is such closeness. Studies that classify the movement space considering only the relationship "offered within infrastructure X" are criticized, since they consider the quantity (accumulation) of people and the speed of walking as the basis in which to define levels of use (that go from A -- free -- to F -- full), assuming that these segments respond for the option of a given route. Meanwhile, what is observed is that aspects such as convenience and attractiveness, or the characteristics of the urban set-up may be more important (Guo & Loo, 2013; Carreno *et al.*, 2002).

Service quality studies, therefore, consider the expectations and priorities of users. According to the NTU (2008, *apud* Cardoso, 2012), such studies consider the perception of those who experienced the service, quantifying the existing availability and the ease of use. Thus, to understand the quality of service is to analyze the consumer's judgment considering comparisons (superiority/inferiority) (Martínez & Martínez, 2010).

Service quality studies traditionally work with the notion of commuting perceived by the user in the environment in which the research has been done. The conditions that make up the environment are given variables in which it is possible to interfere so as to improve how the characteristics are perceived. For example, changes in "police protection" (variable) in a given area can alter the idea of what "security" means.

In the works consulted while compiling this matter, it was noted that the focus given in the case of the DP tended to cover the fundamental conditions of making mobility viable. While in the cases where pedestrians (in the general sense) are objects of study, the aspects tied to how pleasant the environment needs to be to encourage people to go out walking present significant improvement. Taking into account that these factors also influence the decision of wheelchair users, it is necessary to consider studies of the service quality for DPs. It is understandable that facing the greatest sensitivity of the wheelchair users to physical conditions and to the main characteristics (such as security and comfort, as observed in works directed toward this group), they are subjected to a greater burden. Meanwhile, in an inclusive perspective, it is necessary to consider that providing mobility conditions is fundamental for all passers-by who seek fair treatment, and this is the starting point of discussion. And, in this way, it is possible to salvage the satisfaction in getting around in a wheelchair without limiting this feeling to the fact of simply not being exposed to unsafe or uncomfortable situations. In the present article, based on particularities of the group studied, definitions presented and adapted from studies geared toward pedestrians and systemized by Neves *et al.* (2013), there are six pertinent characteristics to consider:

**Accessibility (1):** This is defined by the ease with which the locales and activities may be accessed by individuals, considering their diversity (Aguiar, 2010; Kwan & Weber, 2008). For Vasconcellos, "(...) it can be measured by the number and nature of the destinations (desired) that are reachable by a person." (Vasconcellos, 2000. p. 27).

**Attractiveness (2):** This includes aesthetic and social preservation conditions, and recreational facilities of the common environment. It also considers the sensations which arise from these areas, where it is more likely to stroll (Ambience) (Neves *et al*, 2013; Cohen *et al*, 2009; Keppe Jr., 2008; Kirtland *et al*, 2003; Carreno *et al*, 2002).

**Comfort (3):** This deals with the possibility of undertaking any intended activity without more effort than the daily practice requires. It considers in this way the characteristics present in the space that may cause some discomfort. It also may expose one to outdoor urban conditions like noise and air pollution and climate protection. (Cardoso, 2012; Keppe Jr., 2008; Stradling, 2007).

**Convenience (4):** In common environments, this refers to efficient routes. It deals with facilities offered by the urban ideal and of available opportunities. (Neves *et al*, 2013; Humpel *et al*, 2004).

**Urban safety (5):** This refers to the risk of there occurring crimes, attacks and falls (Theodorakis *et al*, 2013; Ferreira & Sanches, 2010; Gomes *et al*, 2011; Parra *et al*, 2011; Hallal *et al*, 2010; Maghelal & Capp, 2011; Montemurro *et al*, 2011; Leslie *et al*, 2005).

**Traffic safety (6):** This refers to the possibility of conflict between wheelchair users and either vehicles, pedestrians or people riding bicycles as well as insecurity on sidewalks (Ferreira & Sanches *et al*, 2012; Kelly *et al*, 2011; Parra *et al*, 2011; Maghelal & Capp, 2011; Montemurro *et al*, 2011; Hallal *et al*, 2010; Leslie *et al*, 2005; Owen *et al*, 2004; Carreno *et al*, 2002).

Table1. Attributes and authors

Authors	Attributes					
	1	2	3	4	5	6
Theodorakis <i>et al</i> , 2013	X	X			X	
Neves <i>et al</i> , 2013	X	X	X	X	X	X
Cardoso, 2012	X		X		X	
Ferreira & Sanches, 2012	X					X
Lam, 2012			X	X		X
Maghelal & Capp, 2011					X	X
Kelly <i>et al</i> , 2011					X	
Gomes, 2011	X				X	
Montemurro <i>et al</i> , 2011	X	X			X	X
Ferreira & Sanches, 2010	X	X			X	X
Hallal <i>et al</i> , 2010			X		X	X
Aguiar, 2010	X					
Cohen <i>et al</i> , 2009		X				
Keppe Jr., 2008		X	X			X
Stradling <i>et al</i> , 2007	X		X		X	
Leslie <i>et al</i> , 2005	X	X			X	X
Owen <i>et al</i> , 2004	X	X		X		X
Humpel <i>et al</i> , 2004	X	X		X		X
Humpel <i>et al</i> , 2004b	X	X				X
King, 2003				X		
Eyler, 2003						X
Kirtland <i>et al</i> , 2003						
Carreno <i>et al</i> , 2002		X	X	X	X	X
Carnegie, 2002		X				
Guiles-Corti, 2002	X	X				X
Ball, 2001		X		X		
Ferreira & Sanches, 2001		X			X	X
Kocleman <i>et al</i> , 2000			X			
Hovell, 1992				X		

Note: The texts Eyler (2003), King (2003), Carnegie (2002), Guiles-Corti (2002), Ball (2001) and Hovell (1992) was cited by Owen *et al* (2004). And Kocleman *et al* (2000) by Ferreira & Sanches (2005).

Table 2. Attributes and variables associated based on studied authors

Attributes	Variables
Accessibility	Existence of sidewalks, sidewalk surface material, width of pavement, quality of sidewalks, maintenance of surface longitudinal profile of the pavement, bumps, ramps, slopes (topography), barriers, proximity to crossings, adequacy of crossings, elevated tracks to traverse, accessibility, accessible routes, alternate routes, overall walk ability, orientation (boards and signage), length of the walking trail, distance to the trailhead, overall quality of the neighborhood to walk, index physical composition of the environment, residential density, mixed land use, access to commerce and services, access to leisure (beaches, rivers etc.), access to open areas, facilities, access by car and public transport, multimodal facilities, parking.
Attractiveness	Sociability (people in the neighborhood, busy environment, conducive environment for conversations and group activities), physical appearance, cleanliness, presence of dumps, aesthetics, environment, climate, presence of open sewage, scenery, trees, recreational facilities, green areas, attractive architecture, interesting things to see along the route, spaces free of disorder and vandalism.
Comfort	Air pollution, exposure to noise, degree of accessibility to route, longitudinal and cross slope, pavement conditions, ascents and descents, conservation of surface material from the sidewalks, repavement, rest areas, shade and protection against sun and rain.
Convenience	Destination, puddles, dead end streets, walking routes connecting dead-end streets, small distances between intersections, alternative routes.
Urban Security	Sense of security around the stadium, crime rate, traffic, night lighting, round-the-clock sense of safety while in transit, vandalism, police presence, animals and risk of falling.
Traffic Safety	Nearby traffic (volume), traffic speed, traffic interference with walking, sense of safety around adjacent traffic, road width, number of crossings, ease to cross, safe crossings, signage, lowering of sidewalks, view of approaching vehicles, traffic flow at intersections, roadway separation between pavement with grass or flower beds, unsafe sidewalks (holes), difficulty walking, low walking speed, drivers who respect the law, visibility.

Complementary source of table 1: Cardoso, 2012; Salvador *et al*, 2010.

Considering the studies reviewed, the qualities of attractiveness and traffic safety are the most cited in what encourages people, which highlights the importance of a sense of satisfaction with the environment combined with being able to get around without apparent risks. The matter of urban security appears as the third characteristic with the third greatest frequency, indicating that providing police protection and illumination are top priorities. Following in order are accessibility, a topic of utmost importance in the mobility of the DP (Aguar, 2010; Porto Alegre, 2010; Sasaki, 2009). Remembering that part of the material used concerns non-DP pedestrians, the occurrence of this characteristic reveals the importance of the creation of overall accessible areas.

It is intended, based on both this material and the results of the Confederations Cup (presented in section 4) to show the most significant attributes surrounding TGH-related mega sporting events.

### 3. The spectator on wheels: An exploratory assessment of the Confederations Cup

The collection of primary data underlying this article was completed during the games of the FIFA Confederations Cup which took place in the Maracanã on 16/06/2013 (Mexico vs. Italy), 20/06/2013 (Spain vs. Tahiti) and 30/06/2013 (Brazil vs. Spain – Final). In these days of the event, questionnaires were distributed to a group of randomly selected wheelchair users. The process was begun four hours before the games began (so as not to inconvenience the interviewees). However, due to insecurity about the time spent in the accommodations inside the stadium, there was a certain amount of difficulty in being able to gather all the questions necessary (mainly due to starting around one hour before the beginning of the games). Factor in as well the popular, concomitant manifestations (which restricted movement around the stadium), and the fact that this was an exploratory research with a proportionally small group (considering the total population) and relatively more difficult to access - rare sample (Ferreira & Sanches 2012) - some of the questionnaires were distributed on location while a smaller number were sent out via e-mail (for spectators interested in participating later). This piece intends to present the results of this data collection, allowing one to know better wheelchair users who frequent this sort of event and thus, smoothing out the analyses of item 5 (whose aim is to consider the results presented herein, relating them to the texts that support this article).

Table3. Sample Profile

	Characteristics	Responses (%)
Gender	Male	62
	Female	38
Age Range	18-25	13
	26-40	50
	41-55	25
	56-64	6
	65 or over	6
Residence	City of Rio de Janeiro	53
	Other town in RJ Metropolitan Area	6
	Other city in the state of Rio de Janeiro	17
	Other states	18
Autonomy	Other countries	6
	Needing routine assistance	53
	Not needing routine assistance	47

The area of the study comprises the accesses to the nearest metro and rail stations (Maracanã Station and São Cristóvão) and bus stops within 1 km of Maracanã stadium. It was empirically observed that the works completed promoted improvements such as smooth and continuous paving, tree-planting (seeking to create a pleasant microclimate) and landscaping. In regards to accessibility, one could notice that the E-F entrance via Av. Radial Oeste has ramp access to receive wheelchair users. However, along the routes ramps are difficult to get over (very steep), medians causing unevenness in the sidewalk and change in ground (concrete - the rest of the sidewalk - for dirt and grass), and little or no room for wheelchairs to pass.

Considering some relevant aspects contained in the NBR 9.050, spectators were questioned about ground quality, ramp and crossing conditions, and the space for passers-by to move around. They were also asked about the sense of comfort, security and effort. The effort expended is a contribution, assuming the interviewee group has a major physical wear to walk. So, is wanted to understand how this aspect affects them in their perceptions and choices. It was noticed in an ever-increasing measure in the world of wheelchair users that this aspect so often overlooked in academic studies is relevant in choosing a given path to take.

As pertaining to these aspects a review was requested in which the responses varied between great and very bad. Among the respondents, the results that were found are in table 4.

Considering the data shown in table 4, one can verify that among the variables, crossings and ramps are the infrastructural characteristics which cause the most difficulty in using, considering the number of those surveyed who designated them as “Very Bad.” Meanwhile, the same variables were well rated by a considerable cross-section of interviewees. This can be due to the fact that the majority of the respondents entered the stadium through the accessible entrance where the conditions were favorable for receiving wheelchair users. This diversity in the evaluation may be, therefore, a result of different paths taken which would present distinct conditions. Already regarding aspects tied to the perception of wheelchair users (attributes), the comfort linked to effort expended in getting around was the most significant. This little-explored detail ponders a particularity of the group in question, which must be considered in studies focusing on this.

Table 4. Evaluation of Maracanã surroundings

Evaluations	Tangible and intangible characteristics of surroundings (%)						
	Ramps	Crossings	Free spaces	Ground	Effort	Comfort	Safety
Great	23	33	47	33	27	47	50
Good	31	13	13	7	13	27	13
Regular	8	27	20	33	20	7	13
Bad	15	0	7	13	20	7	13
Very bad	23	27	13	13	20	13	13

When assessing the autonomy of respondents as to needing help on the occasion of the interview, it was seen that 47% do not need help regularly, 18% get around independently around the grounds of the Maracanã and 29% need help, which when combined with the 53% that constantly need support, all together, there is a total of 82% of wheelchair users with restricted mobility. This point to the fact that even with sustained improvements, the stadium has not completely designed its surroundings in an inclusive manner, especially in the correction of unevenness (ramps). Table 5 presents the results on the need for aid (for those who unable get around without help) and the points considered most critical (where help might not have been necessary but impacted the displacement).

Table 5. Locations where there was the greatest necessity for assistance and most critical points

Characteristics of surroundings	Percentage (%)	
	Points with greatest need of assistance	Points considered more critical
Correction of unevenness (ramp)	46	45
Sidewalks	8	9
Plantings and sidewalks (discontinuity between ground and grass)	15	18
Distance (to cover)	8	9
Adequacy of crossings	-	18
Information	-	9
General vicinity	8	9
Nothing (everything satisfactory)	15	18

Table 5 show the results of those questioned openly. As expected, the majority of the critical points cited (with the exception of “adequacy of the crossings” and “information”) were the locations where third-party assistance was most necessary. It is important to bring to people’s attention the great difficulty in using the ramps, the obstacle created by the flower beds in the sidewalks and the adequacy of the crossings as a relevant variable to the study. These data reinforce the idea that the routes were not planned within the proposal of all-inclusiveness.

Appreciating the results obtained, it will be sought to tie together the results of the open questions with the variables compiled in the revision of the literature (item 3), observing if there is any harmony between the

two. Based on this then to present the attributes that must be considered in occasions of mega sporting events. This comparison will permit one to understand the interventions that need to be done so as to improve the perception of wheelchair users in the vicinity of the stadium.

#### 4. Quality of mobility for wheelchair spaces: Comparing results

Considering the information presented in sections 3 and 4, we sought to frame the data collected in the field in the attributes collected in the material reviewed.

Starting off with the open-ended answers, the issues identified were compared to the variables in Table 3. Thus, responses were categorized into attributes, signaling strong importance of accessibility, comfort and convenience.

In greater detail were highlighted only in accessibility: “Correction of unevenness” and “distance”; already related to accessibility and comfort were considered: “sidewalks”, “flower beds” and “ground quality”; related to accessibility and to traffic safety: “adequacy of crossings”; to conclude, concerning convenience: “space to get around”; Of all the variables found in the replies, the last one received the best evaluation by most of those interviewed. Table 6 sums up the information presented, pointing out the variables associated with the results of the questionnaires.

Table 6. Framework of responses on attributes

Attributes	Responses	Related Variables
Accessibility	Correction of unevenness	Longitudinal profile of the pavement, ramps, slopes.
	Distance (to cover)	Accessible routes, alternate routes, overall walk ability, length of the walking trail, and distance to the trailhead.
	Sidewalks	Existence of sidewalks, sidewalk surface material, width of pavement, quality of sidewalks, maintenance of surface.
	Plantings and sidewalks (discontinuity between ground and grass)	Barriers.
	Adequacy of crossings	Proximity to crossings, adequacy of crossings, elevated tracks to traverse.
Comfort	Sidewalks	Degree of accessibility to route, longitudinal and cross slope, pavement conditions, ascents and descents, conservation of surface material from the sidewalks, repavement, rest areas, shade and protection against sun and rain.
	Plantings and sidewalks	Degree of accessibility to route.
Convenience	Free spaces	Space to move freely, level of crowd barriers, connectivity, ability to walk to destination.
Traffic Safety	Adequacy of crossings	Number of crossings, ease to cross, safe crossings, signage, lowering of sidewalks.
	Sidewalks	Unsafe sidewalks (holes), difficulty walking, low walking speed.

In addition to the above Table 6, some observations should be made, assuming that the nature of the event brings interferences in other ways considered and not necessarily presented earlier in this work. Holding events like “Cup” games or Olympics or Paralympics have in and of themselves great attractiveness and it is what brings them to the locale of the event in the first place. The preoccupation with aesthetics observed in the projects and the festive environment which are typical, reinforce the relevancy of the attribute attractiveness on these occasions. The matter of safety received an excellent evaluation (Table 4) just below the justification of maintaining a good police presence (reinforced to the aforementioned protests), thus, an urban security was considered relevant. The traffic security was applicable only around the sidewalk areas, in the conflict between pedestrians and wheelchair users, once that unauthorized car traffic was prohibited in the adjacent streets.

And, in this way, it is noticeable that all the attributes compiled in the revision of the literature were applicable in the context of the Confederations Cup (and, by extrapolation, if mega sporting events). Highlighting the accessibility, which is justifiable considering the group surveyed.



Meanwhile, it was noted that the majority of those interviewed lacked aid during the Confederations Cup. Adding to this the evaluations used to the physical characteristics of the analyzed space, the interference in the quality of the environment with regards to freedom and trust for these individuals within the infrastructural provisions of the post-reconstructed Maracanã is evident. Justifiably one can consider other attributes, such as reliability (common in studies on motorized methods of transportation) and autonomy (considering the perception of freedom, independence and quality of life in areas designated for walking).

## 5. Conclusions and Recommendations

This article presented a relationship of attributes and variables deemed adequate to wheelchair users, sharing their views and definitions, so as to contribute to the state of the art and to stimulate discussion on the theme. With the results addressed herein, it was observed that attributes surveyed in works focusing on mobility (whether on foot or in a wheelchair) are widely applicable to this specific context.

It was shown, however, that there is a necessity to think about the quality of service in environments with heavy pedestrian traffic in a way that better caters to DPs. In the case of wheelchair users, it is suggested that there be an increase in the effort as an indicator of the considered attributes (when possible); add the reliability attribute at the analysis; and to develop a characteristic aimed toward promoting more freedom and independence for them (what has been referred to here as “autonomy”).

Some inconsistencies were found in the appraisal. This is attributed especially to the different paths taken by the respondents (one part went around the stadium and another did not -- having gotten off a wheelchair-friendly bus at an accessible entrance with assistance). One must also consider the diversity of these individuals (types of injuries and/or pathology, mobility, choice of modal and socio-economic characteristics) that cannot be duly grasped with such a brief contact. As such, it is interesting that further investigation should take place on a broader scale with a vaster set of techniques.

The closest contact with the group reviewed in this study appears crucial for the refinement of the results, and designating the attributes and variables considering the expectations of wheelchair users. It is believed that just a better understanding of what such individuals experience is what may help build an environment that meets this demand satisfactorily.

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## References

- ABNT (2004) *NBR 9050 – Acessibilidade a Edificações, Mobiliário, Espaços e Equipamentos Urbanos*. Associação Brasileira de Normas Técnicas. 2ª ed. 97 p.
- Aguiar, F. de O. (2010) *Acessibilidade Relativa dos Espaços Urbanos para Pedestres com Restrições de Mobilidade*. Tese – Universidade de São Paulo, Escola de Engenharia de São Carlos. São Paulo.
- Cardoso, B. C. (2012) *Um procedimento para a transferência modal do usuário do ônibus para o trem*. Tese de doutorado. Universidade Federal do Rio de Janeiro, Programa de Engenharia de Transportes. Rio de Janeiro.
- Carreno, M., Willis, A. & Stradling, S. (2002) Quality of service for pedestrians: closing the gaps in knowledge. *Traffic and Transportation Studies*, 326-333.
- Cohen, R. (2006) *Cidade, Corpo e Deficiência: Percursos e Discursos possíveis na experiência Urbana*. Tese de Doutorado. Instituto de Psicologia da Universidade Federal do Rio de Janeiro, Rio de Janeiro.
- Cohen, R., Duarte, C. R. S. & Brasileiro, A. (2009) Inclusion and Accessibility of Persons with Disability in Brazil: Senses and Sensations in the Access to Patrimonial Historical Museums in the State of Rio de Janeiro. *The International Journal of the Inclusive Museum*, 2, 65-83.
- Cosenza, I. F. & Resende, A. P. C. (2006) A cidade e as pessoas com deficiência: Barreiras e caminhos. *Sociedade e natureza, Uberlândia*, 18, 35, 23-34.
- Dell’Olio, L., Ibeas, A. & Cecin, P. (2011) The quality of service desired by public transport users. *Transport Policy*, 18, 2017-2027.
- Ferreira, M. A. G. & Sanches, S. P. (2012) Avaliação da Qualidade dos Espaços de Circulação Urbana: A opinião de dois grupos de cadeirantes. XVII PANAM Congreso Panamericano de Ingenieria de Tránsito, Transporte y Logística, 2012, Santiago, Chile. Anais do XVII PANAM Congreso Panamericano de Ingenieria de Tránsito, Transporte y Logística, 2012. v. 1.

- Ferreira, M. A. G. & Sanches, S. P. (2001) Índice de qualidade das calçadas – IQC. *Revista dos Transportes Públicos, ANTP*, Ano 23, 2º semestre.
- Fonseca, M.P.S & Silva, A. P. (2010) Pesquisando a temática inclusão na formação inicial de professores de Educação Física. *Lecturas Educación Física y Deportes* (Buenos Aires), v. 141, p. 1-1.
- Gomes, G. A. O., Reis, R. S., Parra, D. C., Ribeiro, I., Hino, A. A. F., Hallal, P. C., Maltas, D. C. & Brownson, R. C. (2011) Walking for leisure among adults from three Brazilian cities and its association with perceived environment attributes and personal factors. *International Journal of Behavioral Nutrition and Physical Activity*, 8, 111.
- Guo, Z. & Loo, B. P. Y. (2013) Pedestrian environment and route choice: evidence from Ney York City and Hong Kong. *Journal of Transport Geography*, 28, 124-136.
- Hallal, P. C., Reis, R. S., Parra, D. C., Hoehner, C., Brownson, R. C. & Simões, E. J. (2010) Association Between Perceived Environmental Attributes and Physical Activity Among Adults in Recife, Brazil. *Journal of Physical Activity and Health*, 7, 2, S213-S222
- Humpel, N., Marshall, A. L., Leslie, E., Bauman, A. & Owen, N. (2004). *Changes in Neighborhood Walking Are Related to Changes in Perceptions of Environmental Attributes. Annals of Behavioral Medicine: Environment and Walking*, 27, n. 1.
- Humpel, N., Owen, N., Iverson, D., Leslie, E. & Bauman, A. (2004b) Perceived Environment Attributes, Residential Location, and Walking for Particular Purposes. *American Journal of Preventive Medicine*, 26, nº2, 119-125.
- IBGE (2010) *Censo Demográfico*. Disponível em: <http://censo2010.ibge.gov.br/en/>
- Kelly, C.E., Tight, M. R., Hodgson F.C. & Page, M.W. (2011) A comparison of three methods for assessing the walkability of the pedestrian environment. *Journal of Transport Geography*, 19, n. 6, 1500–1508
- Keppe Junior, C. G. (2008) Formulação de um indicador de acessibilidade das calçadas e travessias. *Pós*, 15, nº 24, 144-161
- Kirtland, K. A., Porter, D. E., Addy, C. L., Neet, M. J., Williams, J. E., Sharpe, P. A., Neff, L. J., Kimsey, C. D. & Ainsworth, B. E. (2003) Environmental measures of physical activity supports: perception versus reality. *American Journal of Preventive Medicine*, 24, 323–31
- Kwan, M. & Weber, J. (2008) Scale and accessibility: Implications for the analysis of land use-travel interaction. *Applied Geography*, 28, 110-123.
- Leslie, E., Saelens, B., Frank, L., Owen, N., Bauman, A., Coffee, N. & Hugo, G. (2005) Residents' perceptions of walkability attributes in objectively different neighbourhoods: a pilot study. *Health & Place*, 11, 227–236.
- Maghelal, P. K. & Capp, C.J. (2011) Walkability: A Review of Existing Pedestrian Indices. *URISA Journal*, 23, Nº 2, 5-17.
- Martínez, J. A. & Martínez, L. (2010) Some insights on conceptualization and measuring service quality. *Journal of Retailing and Consumer Services*, 17, 29-42.
- Montemurro, G. R., Berry, T. R., Spence, J. C., Nykiforuk, C., Blanchard, C. & Cutumisu, N. (2011) Walkable by Willpower: Resident perceptions of neighbourhood environments. *Health & Place*, 12, 895-901.
- Neves, J. M. J., Pereira, L. F. & Portugal, L. S. (2013) Identificação e análise de atributos para compor a Qualidade de Serviço para Pedestres. XXVII ANPET – Congresso Nacional de Pesquisa e Ensino em Transportes, Belém.
- Owen, N., Leslie, E. & Bauman, A. (2004) *Understanding Environmental Influences on Walking*. American Journal of Preventive Medicine, v. 27, n.1, p.67-76.
- Parra, D. C., Hoehner, C. M., Hallal, P. C., Ribeiro, I. C., Reis, R., Brownson, R. C., Pratt, M. & Simões, E. J. (2011) Perceived environmental correlates of physical activity for leisure and transportation in Curitiba, Brazil. *Preventive Medicine*, 52, 234–238.
- Pinto, C. R. S. (2012) *Análise da mobilidade de transporte por parte da pessoa com deficiência física (PcD): Um estudo de caso na RMRJ*. Dissertação de Mestrado. Universidade Federal do Rio de Janeiro, Programa de Engenharia de Transportes.
- PORTO ALEGRE (2010) *Cartilha de acessibilidade arquitetônica e urbanística. Município Legal é Município Acessível*. Porto Alegre.
- Sanches, S. P. & Ferreira, M.A.G (2010) *Quantifying the neighbourhood environment quality for walking*. 12th WCTR, July 11-15. Lisbon, Portugal.
- Stradling, S. G., Anable, J. & Carreno, M. (2007) Performance, importance and user disgruntlement: A six-step method for measuring satisfactions with travel modes. *Transportation Research, Part A*, 41, 98-106.
- Salvador, E. P., Reis, R. S. & Florindo, A.A. (2010) Practice of walking and its association with perceived environment among elderly Brazilians living in a region of low socioeconomic level. *Journal of Behavioral Nutrition and Physical Activity*. Available in: <http://www.ijbnpa.org/content/7/1/67>
- Sasaki, R. K. (2009) Inclusão: Acessibilidade no lazer, trabalho e educação. *Revista Nacional de Reabilitação (Reação)*, São Paulo, Ano XII, mar./abr., 10-16.
- Theodorakis, N. D., Alexandris, K., Tsigilis, N. & Karvounis S. (2013) Predicting spectators' behavioural intentions in professional football: The role of satisfaction and service quality. *Sport Management Review*, 16, 85-96.
- U.S. DEPARTMENT OF JUSTICE (2010a) *ADA Standards for accessible design*. Available in: <http://www.ada.gov/regs2010/2010ADASTandards/2010ADASTandards.pdf>
- U.S. DEPARTMENT OF JUSTICE (2010b) *Guidance on ADA Standards for accessible design*. Available in: [http://www.ada.gov/regs2010/2010ADASTandards/Guidance\\_2010ADASTandards.pdf](http://www.ada.gov/regs2010/2010ADASTandards/Guidance_2010ADASTandards.pdf)
- U.S. DEPARTMENT OF JUSTICE (2009a) *A Guide to disability rights laws* Available in: <http://www.ada.gov/cguide.htm>
- U.S. DEPARTMENT OF JUSTICE (2009b) *III ADA regulation – part 36*. Available in: <http://www.ada.gov/reg3a.html#Anchor-Appendix-52467>
- Vasconcelos, E. A. (1996) *Transporte Urbano nos Países em Desenvolvimento*. 4ª Ed – São Paulo: Annablume, 2000. 276 p

## Consulted sites:

Ferreira & Sanches, 2005, “Rotas acessíveis: Formulação de um índice de acessibilidade das calçadas”. Available in: [http://www.cbtu.gov.br/estudos/pesquisa/antp\\_15congr/pdf/TD-075.pdf](http://www.cbtu.gov.br/estudos/pesquisa/antp_15congr/pdf/TD-075.pdf). Accessed on: June 15, 2013.