



Evaluating limiting factors for people with disabilities using mobility assistive technologies to enjoy National Parks: Comparative findings between Canada and Spain

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Abstract: Research has demonstrated the benefits of nature contact within wellbeing. Outdoor barriers versus amenities can impact on people with mobility/motor disabilities (PwMD) to enjoy nature such as National Parks (NPs). An online questionnaire was designed to obtain information in Canada and Spain on how these barriers influence PwMD to carry out outdoor activities in NPs. It was structured on three main themes: basic data, park's public use and park knowledge. Statistical analysis has shown the predisposition of PwMDs to enjoy nature and highlights the barriers that prevent them from accessing outdoor activities. More research is needed in this area.

Keywords: people with mobility disabilities; outdoor limiting factors; walkability; wheelability; universal accessibility.

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1. Introduction

Natural areas are important for wildlife and for human health and spirit [1]. Particularly National Parks (NPs), defined by the International Union for Conservation of Nature (IUCN) as type II, show one of the best representations of landscapes in all countries offering good opportunities to enjoy nature' benefits where conservation is the main objective, but subject to public use [2, 3]. The right to enjoy nature is for everyone, but not all people have the required physical conditions to access nature. According to WHO [4] around 15% of the population have some type of disability. Within the framework of the Sustainable Development Goals (SDG), tourism in NP has been developed under sustainable tourism criteria, where accessibility and inclusion of all people are considered indisputable goals [5,6].

According to the statistical data in 2012 concerning the estimated 3.77 million of Canadians with some disability, the 8% of them used a wheeled mobility device [7]. In this respect, a most recent state database from 2019 Spanish income tax return database, 2.34 million people declared themselves to be suffering from some form of disability. Or are responsible for the care of a disabled person within the family unit [8].

In this context, studying park conditions in terms of accessibility is necessary to favor an inclusive and equitable use of the parks [9, 10], especially for people who live their life with some type of mobility/motor disability. Because they have to use some type of device in order to move around paths, its walkability or wheelability is determined by the state of the terrain to allow its freedom of movement [11]. This paper focuses on the perception of people with mobility/motor disability (PwMD) about accessibility and looks for the factors preventing the equitable uses of those NPs areas for the public use for PwMD to

transit (walkability or wheelability). Wheeled mobility devices determinate parks usability and desire to go into the forest by PwMD. us- 1
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2. Methodology 3

2.1 Research design 4

This study aims to provide information comparing data in Canada and Spain about visitation frequency, accessibility difficulties and knowledge of NPs by PwMD. Data was gathered through an online questionnaire distributed by UBC-hosted version of Qualtrics [12]. Furthermore, it was approved by the Behavioral Research Ethics Board of the University of British Columbia (Approval Certificate Number: H190-00951) in 2019. The questionnaire has been available to the public from June 2019 to June 2021. A flyer with survey links and project information was distributed through PwDM associations in both countries, using the survey tool. Each participant has a numeric code to undertake the following statistical analysis. The collected material was stored in UBC-hosted version of Qualtrics database. Then text data was codified in Excel to make the analysis with Jamovi software [13]. 5
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2.2 Questionnaire structure 16

The survey has two different sections and information: 17

Section 1: PwMD demographic data: age - 18 to over 77 – spread over 7 age levels; origin through country and region; gender according to the scale of - female, male, other and prefer not to say-; and wheeled mobility device assistance which is classified as - crutches, walkers, manual wheelchair, power wheelchair, scooter, prosthesis, walking stick /canes, other – then clustered in two groups 1) People who stated that they use - crutches, walking stick / canes or walker -, and 2) People who require a wheelchair model - manual wheelchair, power wheelchair, and scooter -. 18
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Section 2: information about the PwMD use of NP in terms of walkability/wheelability: 1) Factors such as visitation frequency, preferences and barriers or difficulties, interest and landscapes preferences; 2) Limiting factors as distance, slope, surface of the path, and weather conditions. 25
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Specifically, statistical analysis has been undertaken first through frequencies of each variable. Then, to obtain the limiting factors for PwMD, F-test is applied. χ^2 Tests, sample size (n) and probability (p) show the existence or not of significant differences between the type of wheeled mobility device assistance, that each user requires for their daily life in the different queries, that arise from situations that can occur wheeling or walking the paths in a park. 29
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3. Results 35

3.1 Population profile 36

227 persons have participated in the online questionnaire of which only 116 are correct. Of the total, 38% are from Canada and 61% reside in Spain. Gender by country shows that in Canada 48% are female, 45% male, 2% other and 4% prefer not to say; in Spain 33% are female and 63% male. Regarding age in Canada there is representation from each of the age levels, with the 48-57 range being the most represented (28%). This same analysis in Spain has shown the range 38-47 to be the most represented, highlighting that there has been no response from people aged between 18-27 years. 37
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In terms of mobility devices, the largest group in both countries is group 2, specifically manual wheelchair 44% in Canada and 57 % in Spain, power wheelchair 17% and 24%, and power scooter 7% and 5% respectively. Group 1 consists of people who move using a walking stick, 24% Canada and 7% in Spain; and crutches 6% and 7% respectively. Regarding driver's license and vehicle, results show: in Canada, 74% has car license (group 1=17% and group 2= 57%) and 94% their own vehicle (group 1=15% and group 2= 54%); in Spain, 80% has car license (group 1=16% and group 2= 64%) and 77% their own 44
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car (group 1=11% and group 2= 66%). Finally, there is no significant difference between groups 1 and 2 in terms of nature desire and enjoyment, almost 100% of people asked in both countries agrees.

3.2 Public use of parks by people with mobility/motor disability.

Regarding the maximum distance that respondents feel comfortable, with five possible options (1 = 0-500m; 2 = 500m-1km; 3 = 1-2km; 4 = 2-4km; 5= > 4km), a homogeneous distribution of the responses is noted between group 1 and group 2. Manual and power wheelchair users stand out consider themselves capable of traveling greater distances, being that powered wheelchair users even choose a distance more than 4 km with a relative frequency of 26% in Canada, and 54% in Spain. Conversely, group 1, people who can walk but with some type of walkability device, has not selected this option. The most limiting meteorological conditions are snow, rain and temperatures below 10 °C. About preferred landscape, mountain and ocean are the most desired with no significant differences between countries.

Table 1 shows the importance of distance according to slope with the two principal groups of device. Device groups present significant differences for slope between 5 and 10% in both countries and very significant difference in slope greater than 10% in Spain.

Table 1. F-Test results with the effects of slope factors according to PwMD groups

Slope	Canada			Spain		
	χ^2	<i>n</i>	p	χ^2	<i>n</i>	p
0%	10.6	46	0.032	10.6	70	0.032
0 – 5 %	10.41	46	0.034	6.32	70	0.0177
5 – 10 %	4.29	46	0.369 (*)	5.47	70	0.242 (*)
> 10%	14.08	46	0.007	1.52	70	0.823 (**)

(**) very significative (*) significative

Table 2 presents results about others limiting factors (not circular path, narrow path, irregular surface, absence of signage or weather conditions) and its effects in device groups. Almost all the situations posed have differential effects to PwMD according device groups with significant or very significant differences depending on the country. Traversing around a not circular path is even more important in Spanish case, as occurred with irregular surface of path where group 2 would not use it. Contrarily, absence of signage seems to be more important for Canadian people. Finally, Canadians groups do not feel conditioned by meteorological conditions, while for Spanish it is an aspect that can have a differential effect relating to the type of technical aid they use.

Table 2. F-Test results with the effects of others limiting factors or situations according to PwMD groups.

Situation	Canada			Spain		
	χ^2	<i>n</i>	p	χ^2	<i>n</i>	p
Not circular path	1.91361	46	0.384 (*)	0.00838	70	0.996 (**)
Narrow path	0.48	46	0.787 (**)	0.199	70	0.905 (**)
Irregular surface path	1.8	46	0.407 (*)	0.244	70	0.885 (**)
Absence of signage	0.0396	46	0.98 (**)	1.1622	70	0.559 (*)
Weather conditions	6.66	46	0.036	1.67	70	0.435 (*)

(**) very significative (*) significative

4. Conclusion

According to the results obtained, desire and enjoy in natural spaces of the most of the respondents to survey exists, in particular people who require a wheelchair model. This group is more active than those who use other mobility devices. Considering that one of the main barriers for people who move by wheelchair is the slope, paradoxically, wheelchair users in both countries seem to be more daring in terms of the distance traveled with the proposed slopes. Likewise, it can be concluded that there are direct relationships between the type of assistance and limiting factors to navigate freely along the paths of a park.

Finally, our survey brings other limiting factors that future analysis should carry out in a more extended research. The differences between both countries found in the perception of path shape, surface regularity and weather conditions should be furthered explored.

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