

ORIGINAL ARTICLE

## A nationwide Danish survey on the use of green spaces by people with mobility disabilities

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### Abstract

**Background:** There is increasing awareness of the importance and health benefits of living near green spaces. Research usually focuses on the general population's use of green spaces and there has been little focus on the use of green spaces by specific groups, such as people with mobility disabilities. This represents a significant knowledge gap with regard to facilitating access to healthy green environments by all population groups. This study aims to provide knowledge of the use of green spaces by people with mobility disabilities. **Methods:** The study was based on data from the Danish Health and Morbidity Survey in 2005. The study participants consisted of 11,238 adult Danes, 383 of whom reported mobility disabilities, meaning that they were dependent on assistive devices for walking or moving around. Multiple logistic regression analysis was used to investigate the association between mobility disability and use of green spaces. **Results:** The results show that respondents who reported mobility disabilities visited green spaces less often than respondents without mobility disabilities. The severity of the mobility disability was associated with the frequency of visits. Frequency of visits was also related to the respondents' health-related quality of life status. **Conclusions:** **These results highlight the need for further research into the constraints faced by people with mobility disabilities with regard to visiting green spaces.**

**Keywords:** *Epidemiology, health-promoting environments, health survey, nature consumption, physical accessibility, salutogenic perspective, Short Form 36, universal design*

### Introduction

As the world undergoes rapid urbanization, there is an increasing political focus on creating healthy everyday living environments with access to green spaces [1,2]. A number of studies have demonstrated that green spaces can positively affect health and wellbeing by providing opportunities for physical activity, restoring attention capacity, enhancing positive mood and providing stress relief [3–5]. The term 'green space' refers to the many forms of natural environments in and around urban areas, such as gardens, parks and lakes, as well as more remote areas, such as forests, grasslands, rivers and beaches [6].

Previous Danish studies (based on the same data as the present study) have demonstrated that people

who live short distances (<1 km) from the nearest green spaces visit them more frequently [7] and that visiting green spaces is associated with a higher health-related quality of life [8], a conclusion that is supported by the results of other similar studies [9,10]. A European study conducted in collaboration between Sweden, Lithuania and the Netherlands [11] recommends a maximum of 300 m from home to the boundary of the nearest urban green space as a public health indicator.

Although there is substantial knowledge about the general Danish population's use of and distance from green spaces, knowledge is lacking about whether particular groups in the population are less inclined

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to use green spaces and thereby do not benefit from their apparent health-promoting qualities. The results from the Danish study by Schipperijn et al. [7] showed that 0.9% of the population never visited green spaces and that age, education, ethnicity and marital status influenced the frequency of visits. A similar Danish national study on the specific use of green spaces outside urban areas found that 9% of respondents had not visited such a space within the past year [12]. Neither research project determined whether people with physical disabilities were among the population groups less inclined to visit green spaces. This question is relevant because research shows that having a physical disability is associated with extensive mental and physical health challenges [13–15]. We may thus assume that this population group has an even greater need for the health-related benefits that green spaces seem to provide.

The World Health Organization's International Classification of Functioning, Disability and Health (ICF) [16] is currently the standard framework for measuring health and disability at individual and population levels [17]. It provides a standard language and defines disability as not just a health condition, but a complex interaction of individual, societal and environmental factors.

Making green spaces accessible to people with disabilities is challenging and, according to the Danish Disability Sport Information Centre, many Danes with physical disabilities experience involuntary exclusion from green spaces with a nature-like character [18]. However, research indicates that people with physical disabilities have the same attitudes towards and preferences for green spaces as people without physical disabilities [19,20].

Visiting green spaces may be especially challenging for people who experience mobility loss, which is one of the most common physical disabilities in Denmark [14]. It is nevertheless difficult to estimate how many people in Denmark have a mobility disability because the various studies conducted on this subject have applied different definitions [21]. In the most recent national survey, which was conducted in 2014, 16.9% of the population reported a physical disability, of which people with mobility disabilities accounted for 42% [22].

Knowledge is lacking regarding this particular group's use of green spaces, representing an obstacle to the political aim of providing healthy living environments with access to green spaces for all and meeting the requirements of the United Nation's Convention on the Rights of Persons with Disabilities, which Denmark signed in 2009 [23].

This study aims to provide insight into the use of green spaces by people with mobility disabilities,

including the associations between the frequency of use and distance as well as frequency of use and health-related quality of life status. It also considers the reasons for visiting green spaces.

## Methods

The data for this study were derived from the 2005 Danish Health and Morbidity Survey. These surveys seek to describe the status and trends in health and morbidity in the adult Danish population and the 2005 survey was based on a region-stratified random sample from the Danish Civil Registration System of 21,832 adult Danes (aged 16 or older) [24]. The handling of data was approved by the Danish Data Protection Agency. Prior to data collection, all selected participants received a letter of introduction describing the purpose and content of the study. Data were collected via face-to-face interviews at the respondents' homes, lasting about one hour. Following the interviews, all the respondents were asked to complete a self-administered questionnaire, which was handed over personally after the interview, together with a self-addressed stamped envelope (for more information on the survey's study design, see Ekholm et al. [24]). In total, 14,566 participants completed the personal interviews and, of these, 11,238 participants also completed the self-administered questionnaire.

The analyses in this study were restricted to participants who completed both the face-to-face interview and the self-administered questionnaire. Background information was collected in the face-to-face interview prior to the self-administered questionnaire regarding sex (answer categories: female, male), age (answer categories: 16–44, 45–64, ≥65 years of age), cohabitation status (answer categories: married, cohabiting, single (divorced), single (widower), single (unmarried)) and education level in accordance with the International Standard Classification of Education, which combines school and vocational education.

Respondents with mobility disabilities were defined by inclusion in the International Classification of Functioning, Disability and Health classification 'Moving around using equipment' (16:D465) and exclusion from the classifications 'Walking' (16:D450) and 'Moving around in different locations without the use of assistive devices' (16:D460). They were identified by a question in the face-to-face interview that asked whether they could move around freely or had to use assistive devices. This question was divided into the following three answer categories, with only one answer being possible: (a) I can walk on my own without any problems ( $n=10,855$ );

(b) I use a walker, crutches, or cane ( $n=323$ ); and (c) I use a wheelchair ( $n=60$ ). The division of respondents ( $n=11,238$ ) into the three answer categories formed the three groups in this study.

The self-administered questionnaire included three questions regarding respondents' distance to and use of green spaces (specifically, beach, sea, lake, park, forest and other open natural spaces) within the past six months of the summer season (April to September). The first question dealt with how far the respondent lived from the nearest green space, with the answer categories being <300 m, between 300 m and 1 km, and >1 km. This question was repeated for each type of green space. Next, respondents were asked how frequently they visited the green spaces, with the answer categories being daily, several times a week, weekly, monthly, seldom or never. The last question focused on the respondents' main reasons for visiting green spaces (see Table V for possible answer categories).

The Short Form 36 (SF-36 Version 1) was included in the self-administered questionnaire to assess respondents' health-related quality of life status [25]. SF-36 is a 36-item survey that measures eight dimensions of health (bodily pain, physical functioning, general health perceptions, mental health, physical role functioning, emotional role functioning, social role functioning and vitality). The scores from each subscale range from 0 to 100 (higher scores indicate better health).

#### *Statistical analysis*

The *F*-test was used to compare means for continuous outcomes. The Pearson  $\chi^2$  test was used for categorical data. Fisher's exact test was used when assumptions for the  $\chi^2$  test were violated. Multiple logistic regression analysis was used to investigate the association between mobility disability and seldom or never visiting various green spaces. The model was adjusted for sex, age, living status, highest completed educational level and distance to green space. Results from the logistic regression model are presented as odds ratios (OR) with 95% confidence intervals.

An 'all green spaces' index was calculated on the basis of responses to the four questions on frequency of visits to green spaces. Respondents were classified as daily users of green spaces if they answered 'daily' to at least one of the four questions. They were classified as users of green spaces several times a week if they answered 'several times a week' to at least one of the four questions (and not 'daily' to any of the four questions). The remaining categories were coded accordingly. Participants with missing data on all four items were excluded from the specific analyses.

Age-adjusted mean scores were estimated for each of the eight SF-36 subscales using a direct standardization method with the total Danish population as the standard population. The scoring instructions for the eight subscales were used and missing values were treated in accordance with the instructions. The scores of the eight subscales are the weighted sums of the questions in the respective section. In addition, the Physical Component Summary and Mental Component Summary scores from the SF-36 were calculated. The component summary scores were standardized to the general population in the USA.

Survey sample weights were used in all analyses to produce correct population estimates. Statistical analyses were performed using SAS version 9.3.

#### **Results**

The levels of item non-response were generally very low (<1% in the face-to-face interview and <2% in the self-administered questionnaire). However, the levels of non-response were higher for the eight SF-36 subscales and the two component summary scores (0.1–9.3%). Participants with a missing value on a certain variable were excluded from the specific analyses using this variable.

A significantly higher percentage of respondents with mobility disabilities were >65 years of age, had a short time in education and lived alone compared with the respondents without mobility disabilities (Table I). The majority of the respondents with and without mobility disabilities reported living <300 m from the nearest green space. Among the respondents who used a wheelchair for mobility, 82.3% reported living <300 m from a green space, whereas the result was 64.5% for respondents using canes, crutches or walkers and 66.9% for respondents not using assistive devices.

Respondents with mobility disabilities had significantly lower mean scores on all eight SF-36 subscales ( $p<0.0001$ ) (Table II). The respondents with the most severe mobility disabilities (wheelchair users) reported the lowest health scores on all subscales. The Physical Component Summary scores were substantially lower among participants with mobility disabilities (24.0 and 30.8, respectively) than among participants without mobility disabilities (51.4) ( $p<0.0001$ ). The Mental Component Summary scores were also lower among participants with mobility disabilities (50.4 and 51.8, respectively) than among participants without mobility disabilities (54.6) ( $p<0.0001$ ).

Table III presents the respondents' frequencies of visits to different green spaces. There was a significant association between mobility disability and

#### 4 Green spaces and mobility disabilities

Table I. Main characteristics of the study population (N=11,238).

	Wheelchair users (n=60)	Users of canes, crutches or walkers (n=323)	Not using assistive devices (n=10,855)	p <sup>a</sup>
<b>Sex</b>				0.4703
Male	49.1	43.0	46.2	
Female	50.9	57.0	53.8	
Total	100.0	100.0	100.0	
<b>Age (years)</b>				<0.0001
16–44	9.1	2.8	43.1	
45–64	25.8	20.4	38.7	
≥65	65.1	76.8	18.3	
Total	100.0	100.0	100.1	
<b>Cohabitation status</b>				<0.0001
Married/cohabiting	56.3	46.6	73.4	
Living alone	43.7	53.4	26.6	
Total	100.0	100.0	100.0	
<b>Education (years)</b>				<0.0001
<10	45.1	36.7	12.4	
10–12	32.4	34.3	26.5	
≥13	22.5	28.4	58.9	
Other (e.g. in school, foreign education)	0.0	0.6	2.2	
Total	100.0	100.0	100.0	
<b>Distance to green space<sup>b</sup></b>				<0.0001
<300 m	82.3	64.5	66.9	
300 m–1 km	7.6	23.9	27.1	
>1 km	10.1	11.7	6.0	
Total	100.0	100.1	100.0	

All data are presented as percentages.

<sup>a</sup>p-value for the association between the various background characteristics and mobility disability (obtained from Pearson  $\chi^2$  test).

<sup>b</sup>The response rate to this question was lower (N=11,092) than the overall response rate (N=11,238). The response rate for wheelchair users was n=5; for users of canes, crutches or walkers n=303; and for those not using assistive devices n=10,732.

Table II. Mean scores on the eight SF-36 subscales and the two component summary scores by mobility disability status (N=11,238).

	Wheelchair users (n=60)	Users of canes, crutches or walkers (n=323)	Not using assistive devices (n=10,855)	p <sup>a</sup>
Physical functioning	18.1 (11.7–24.6)	40.7 (37.9–43.4)	90.3 (90.0–90.6)	<0.0001
Physical role	16.2 (7.0–25.4)	21.5 (17.4–25.6)	84.8 (84.2–85.4)	<0.0001
Bodily pain	43.7 (35.8–51.7)	50.4 (47.3–53.4)	79.2 (78.8–79.6)	<0.0001
General health	31.8 (26.7–37.0)	46.7 (44.1–49.3)	76.8 (76.5–77.2)	<0.0001
Vitality	39.2 (32.2–46.2)	45.6 (42.7–48.4)	70.8 (70.4–71.2)	<0.0001
Social functioning	59.7 (52.6–66.8)	70.2 (66.9–73.4)	92.9 (92.6–93.2)	<0.0001
Emotional role	48.4 (33.8–63.0)	55.5 (50.1–60.9)	88.7 (88.2–89.2)	<0.0001
Mental health	71.5 (66.4–76.8)	75.2 (73.0–77.4)	83.2 (82.9–83.5)	<0.0001
Physical component summary	24.0 (21.4–26.5)	30.8 (29.5–32.1)	51.4 (51.3–51.6)	<0.0001
Mental component summary	50.4 (46.0–54.7)	51.8 (50.3–53.3)	54.6 (54.4–54.8)	<0.0001

Data presented as mean (95% CI) values.

<sup>a</sup>p for the association between the various health characteristics and mobility disability (obtained from F-test).

frequency of visits to the different green spaces ( $p<0.0001$ ). A very small proportion of respondents without mobility disabilities reported that they seldom or never visited various green spaces (beach, sea, lake, park, forest or other open natural spaces) compared with respondents with mobility disabilities. With regard to the ‘all green spaces’

index variable, 1.5% of respondents without mobility disabilities reported seldom or never visiting green spaces, whereas the figure was 21.7% for wheelchair users and 14.1% for users of canes, crutches or walkers (Table III). The reported use of ‘all green spaces’ on a daily basis was lowest among wheelchair users (26.1%).

Table III. Frequency of visits to green spaces.

	Wheelchair users	Users of canes, crutches or walkers	Not using assistive devices	<i>p</i> <sup>a</sup>
<b>Beach, sea, lake</b>				<0.0001
Daily	7.3	12.6	13.4	
Several times a week	17.8	11.8	20.1	
Weekly	14.1	12.4	28.8	
Monthly	18.9	21.3	28.6	
Seldom or never <sup>b</sup>	42.0	41.9	9.1	
Total	100.0	100.0	100.0	
No. of respondents <sup>c</sup>	53	267	10.499	
<b>Park</b>				<0.0001
Daily	11.6	30.7	30.9	
Several times a week	24.0	11.8	28.2	
Weekly	22.7	21.2	23.1	
Monthly	18.3	14.2	12.5	
Seldom or never <sup>b</sup>	23.5	22.1	5.3	
Total	100.0	100.0	100.0	
No. of respondents <sup>c</sup>	48	266	10.411	
<b>Forest</b>				<0.0001
Daily	6.8	10.9	11.0	
Several times a week	11.6	6.6	16.0	
Weekly	18.6	13.0	22.9	
Monthly	19.7	24.9	33.9	
Seldom or never <sup>b</sup>	43.4	44.6	16.2	
Total	100.0	100.0	100.0	
No. of respondents <sup>c</sup>	48	257	10.354	
<b>Other open natural spaces</b>				<0.0001
Daily	21.1	20.9	27.3	
Several times a week	13.1	13.6	20.0	
Weekly	13.7	16.5	20.9	
Monthly	19.1	18.1	20.7	
Seldom or never <sup>b</sup>	33.0	30.9	11.2	
Total	100.0	100.0	100.0	
No. of respondents <sup>c</sup>	47	260	10.364	
<b>Total: all green spaces</b>				<0.0001
Daily	26.1	36.8	43.3	
Several times a week	16.5	16.8	30.3	
Weekly	21.8	19.3	18.6	
Monthly	14.0	13.0	6.4	
Seldom or never <sup>b</sup>	21.7	14.1	1.5	
Total	100.0	100.0	100.0	
No. of respondents <sup>c</sup>	59	301	10.686	

All data are presented as percentages.

<sup>a</sup>*p* for the association between frequency of visits to green spaces and mobility disability (obtained from Pearson  $\chi^2$  test).

<sup>b</sup>The answer categories 'seldom' and 'never' have been merged into one category 'seldom or never'.

<sup>c</sup>The numbers of respondents who answered the questions regarding 'frequency of visits to green space' varied between the types of green spaces.

The strong association between frequency of visits to green spaces and mobility disability was confirmed in a multiple logistic regression analysis ( $p < 0.0001$ ) adjusted for sex, age, cohabitation status, education and distance to green spaces (data not shown). Wheelchair users had more than 20 times higher odds (adjusted OR 21.74, 95% CI 9.33–50.68) to seldom or never visit green spaces than respondents without mobility disabilities. Users of canes, crutches and walkers had more than seven times higher odds

(adjusted OR 7.48, 95% CI 4.76–11.76) to seldom or never visit green spaces than respondents without mobility disabilities. The analyses also showed that wheelchair users had a 2.91 (95% CI 1.18–7.15) times higher OR to seldom or never visit a green space than users of a cane, crutches or a walker.

In terms of distance to green space and frequency of visits, both respondents with and without mobility disabilities stated that they visited green spaces less often the longer the distance to the nearest green

Table IV. Age-adjusted mean scores on the eight SF-36 subscales and the two component summary scores by mobility disability status and frequency of visits to green spaces ( $N=10,968^a$ ).

	Users of canes, crutches or walkers				Not using assistive devices			
	Seldom or never <sup>b</sup> ( $n=40$ )	Monthly or weekly <sup>b</sup> ( $n=95$ )	Several times a week or daily <sup>b</sup> ( $n=163$ )	$p^c$	Seldom or never <sup>b</sup> ( $n=155$ )	Monthly or weekly <sup>b</sup> ( $n=2612$ )	Several times a week or daily <sup>b</sup> ( $n=7903$ )	$p^c$
Physical functioning	33.5	38.6	48.7	0.0029	78.9	88.7	90.9	<0.0001
Physical role	7.5	17.5	24.9	0.0213	68.8	82.4	85.4	<0.0001
Bodily pain	49.7	38.3	42.9	0.5341	73.3	78.2	79.7	<0.0001
General health	39.5	43.3	45.6	0.0128	66.0	74.1	77.8	<0.0001
Vitality	47.5	41.9	48.0	0.0009	61.5	67.5	72.2	<0.0001
Social functioning	44.5	64.8	76.9	0.0001	84.0	92.0	93.5	<0.0001
Emotional role	32.7	59.0	68.9	0.0533	75.6	85.6	89.7	<0.0001
Mental health	68.1	72.0	77.1	0.0045	76.7	81.2	84.2	<0.0001
Physical component summary	27.3	28.4	30.3	0.0140	46.9	50.7	51.5	<0.0001
Mental component summary	45.3	51.3	54.0	0.0088	51.6	53.5	55.1	<0.0001

<sup>a</sup>Users of wheelchairs are excluded from this analysis as there were only a few participants in each group. Data are missing for 210 respondents, including 25 respondents using canes, crutches or walkers and 185 respondents not using assistive devices.

<sup>b</sup>Answer categories 'seldom' and 'never' are joined together into one category 'seldom or never'. The answer categories 'monthly' and 'weekly' are joined together into one category 'monthly or weekly'. The answer categories 'several times a week' and 'daily' are joined together into one category 'several times a week or daily'.

<sup>c</sup> $p$  for the association between health-related quality of life and frequency of visits to green space (obtained from  $F$ -test).

space (data not shown). Greater differences (percentages) were found in the frequency of visits between respondents using assistive devices and respondents not using assistive devices when the distance increased. For example, 20.3% of respondents using assistive devices stated that they seldom or never visited a green space if they lived >300 m from the nearest green space, whereas this figure was 2.2% for respondents not using assistive devices ( $p<0.0001$ ). When the distance increased to >1 km, the respondents who stated that they seldom or never visited green spaces increased to 30.6% for respondents using assistive devices and to 6.9% for respondents not using assistive devices ( $p<0.0001$ ).

Among the respondents with mobility disabilities, we found that those who reported they seldom or never visited a green space also had lower overall mean values on all the SF-36 subscales and the two component summary scores than did those who visited a green space more regularly, although this was not significant for the bodily pain and emotional role subscales ( $p>0.05$ ) (Table IV). The same pattern was observed among respondents without mobility disabilities ( $p<0.0001$  for all eight subscales and the two component summary scores).

Table V shows that most respondents in all three groups (wheelchair users, users of canes, crutches or walkers and people not using assistive devices) answered 'yes' when asked whether they visited green spaces to enjoy the weather and get fresh air. Only 19.6% of wheelchair users also answered that they

visited green spaces to relieve stress and relax, whereas this proportion was 33.7% for respondents using other mobility aids and 59.2% for the respondents not using assistive devices.

## Discussion

The results from this study confirm that participants with mobility disabilities are among the population groups who are more likely to seldom or never use green spaces. This is unsurprising because these people with mobility disabilities are already challenged in their ability to move around in their daily lives, so that even arriving at a green space could be considered a possible constraint, although no research exists on this. The results show an association between living close to a green space and frequently visiting green spaces for respondents both with and without mobility disabilities, which is in line with previous research, e.g. in Finland, on the general population [26]. It seems, however, that respondents with mobility disabilities are more affected by living >1 km from the nearest green space than respondents without mobility disabilities. However, the vast majority of respondents with mobility disabilities live <300 m from the nearest green space. Another explanation for why this group uses green spaces less than the population without mobility disabilities could be that the constraints associated with visiting also involve the accessibility of the green space itself, not just the distance to the

Table V. Most important reasons for visiting green spaces (N=11,078<sup>a</sup>).

	Wheelchair users (n=59)	Users of canes, crutches or walkers (n=307)	Not using assistive devices (n=10,712)	p <sup>b</sup>
To enjoy the weather and get fresh air	73.1 (61.4–84.9)	77.9 (73.3–82.6)	87.6 (86.9–88.2)	<0.0001
To relieve stress, relax	19.6 (9.1–30.1)	33.7 (28.4–39.0)	59.2 (58.3–60.2)	<0.0001
To exercise, keep in shape	4.9 (0.0–10.6)	38.5 (33.1–44.0)	55.4 (54.5–56.4)	<0.0001
To do something with friends and family	29.2 (17.2–41.3)	34.8 (29.5–40.2)	51.9 (51.0–52.8)	<0.0001
To follow the seasons, flora and fauna	34.3 (21.7–46.9)	51.2 (45.6–56.8)	45.3 (44.4–46.3)	0.0319
To get some peace and quiet	19.1 (8.6–29.5)	21.1 (16.5–25.6)	31.1 (30.2–32.0)	0.0002
Other reasons	15.4 (5.9–25.0)	15.1 (11.1–19.1)	17.0 (16.3–17.7)	0.6633

All data presented as percentages (95% CI). Respondents were permitted to give multiple answers.

<sup>a</sup>Data are lacking from 185 respondents, including one respondent using a wheelchair, 16 respondents using canes, crutches or walkers and 143 respondents not using assistive devices.

<sup>b</sup>p for the association between reasons for visiting green spaces and mobility disability (obtained from Pearson  $\chi^2$  test).

green space. There could also be possible inter- and intrapersonal constraints – for instance with regard to social support or participant preferences [27]. Although research on leisure constraints, nature and disability is beginning to emerge – for example in the form of a recent review article [28] – research in this area has generally focused on the non-disabled population. The most comprehensive study specifically concerning constraints to visiting outdoor spaces for people with mobility disabilities is a national survey conducted in the USA on outdoor recreation [29]. In line with the present results, the US survey found that participants with mobility disabilities generally participated less in outdoor recreational activities and that they experienced more constraints than participants without mobility disabilities [29]. The main constraints experienced by respondents with mobility disabilities concerned personal health and safety, lack of mobility assistance, inadequate facilities and poorly maintained areas [29]. Not all the outdoor environments included in the survey were green spaces, meaning that the results on constraints are not directly transferable to the present study on green spaces.

Although the results regarding frequency of visits to green spaces by people with mobility disabilities are unsurprising, they nevertheless give rise to concern because they mean that this group benefits less from the health-promoting potential of green spaces. With regard to health status, respondents with mobility disabilities report less good health than respondents without mobility disabilities. We could therefore assume that this group of people is in greater need of the health benefits that green environments can provide, but are more constrained in visiting due to their mobility disabilities.

The reported health status of respondents with mobility disabilities is in line with previous research [13,14], which shows that people with physical disabilities generally face greater health challenges than

the population without physical disabilities. The results also show that respondents' health status is related to the severity of mobility disability, which is supported by the findings in an international World Health Survey on health and health-related outcomes and their determinants [15]. It should, however, be noted that most respondents in this study with mobility disability were older than 65 years and old age is also related to poorer health [30] and a higher prevalence of disabilities [13], which explains why older people are disproportionately represented in disability populations [13].

#### *Future perspectives*

To gain an understanding of why mobility-disabled participants use green spaces less than participants without mobility disabilities, future research must explore the constraints faced by participants with mobility disabilities with regard to both travelling to green spaces and spending time there. This research project will thus continue to conduct interviews with participants with mobility disabilities to identify the constraints and preferences relating to visiting green spaces. Research and design solutions in this area can guide landscape planners and architects, thereby facilitating equal access to and opportunities for experiencing green spaces.

#### *Limitations*

We acknowledge that there are some limitations to our study. First, causal associations could not be established due to the cross-sectional nature of the study. Second, the number of respondents with mobility disabilities was fairly low (especially the number of wheelchair users) and the wide confidence intervals related to this group's frequency of use of green spaces indicates that the estimates are highly variable. The survey data allowed only a fairly rigid

division of the three groups solely based on their use of assistive devices, which blurs possible nuances in respondents' capacities in different contexts, the use of different assistive devices and their need for personal assistance. Another limitation concerns the reliability of the results. As the data were collected in 2005, the answers may differ today – for example, due to changes in the accessibility of green spaces, social networks or services. However, more recent national data on the subject do not exist.

## Conclusions

Participants with mobility disabilities generally visit green spaces less often than participants without mobility disabilities and the frequency of their visits is related to their health status and the severity of their mobility disability. Living further from green spaces is associated with less frequent visits for both participants with and without mobility disabilities. The results call for further research into the constraints faced by participants with mobility disabilities with regard to using green spaces, thereby facilitating access to health-promoting green environments for all.

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