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Why don't we go outside? – Perceived constraints for users of urban greenspace in Sweden

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ABSTRACT

Urban greenspace (UGS) is important for human wellbeing, particularly physical and mental health, and is claimed to support social cohesion. However, the expansion and densification of urban centres in recent decades has occurred largely at the expense of UGS. This risks its attractiveness for users. Although recent research has identified various factors that influence the use of UGS in different contexts, few studies have taken an explicit, bottom-up approach to understand which factors constrain willingness to use it. This study analyses responses from an online survey in Sweden (N = 2806) to identify the main constraints to UGS usage, and for whom these are constraints. Respondents could select from 22 different types of constraints – relating to incivilities, management, accessibility and availability, safety, and personal issues. Respondents could also provide comments to identify additional constraints. Incivilities were the most perceived problem. For example, litter was selected by 53% of respondents, while vandalism was selected by 24%. At the same time, many respondents perceived few or no constraints – 59% stated that nothing prevented them from using UGS, while 35% stated that they saw no problems. Safety-related and accessibility/availability constraints were not strongly identified although many respondents commented that UGS in Sweden is inadequate given the large number of users, and that the UGS that people want to use the most is often inaccessible without a car. Multiple binary logistic regression was used to investigate relationships between perceptions of constraints and fourteen predictor variables. Odds ratios were used to determine whether significant ($p < 0.05$) relationships were meaningful. Our findings show that different groups have starkly divergent perceptions of constraints relating to UGS. Several key factors – including age, self-reported nature-connectedness, distance to UGS, and frequency of use – were associated with a heightened likelihood of perceiving different groups of constraints. However, relationships between constraints and factors relating to environmental justice were not straightforward. These findings indicate the complexity of UGS planning challenges relating to densification, the New Urban Agenda and promotion of societal benefits, and a need to further integrate multiple user perspectives, especially of younger adults and infrequent users.

1. Introduction

Urban greenspace (UGS) is the main supplier of ecosystem services in urban areas for human wellbeing, particularly for physical and mental health (Douglas et al., 2017; Engemann et al., 2021), and has been a crucial asset for urban populations during the COVID-19 pandemic (Fagerholm et al., 2022; Venter et al., 2020). However, expansion and densification of urban areas during recent decades – driven by globalisation, urbanisation and environmental concerns – have occurred largely at the expense of UGS (Haaland and van den Bosch, 2015). At the same time, swelling urban populations have increased the pressure on existing UGS, leading to fragmentation and difficulties in maintaining its diverse social and ecological values, thereby risking its attractiveness for users (Boverket, 2019; Grahn and Stigsdotter, 2010).

Maintaining UGS and maximising its potential benefits for diverse urban populations is therefore an increasingly difficult task for urban

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spatial planners (Haaland and van den Bosch, 2015; Thomson and Newman, 2021). A core challenge is ensuring that people choose to visit UGS (Haase et al., 2017; Hitchings, 2013). An exploration of the literature reveals a wide variety of factors that influence the use of UGS in different contexts (e.g. Farahani and Maller, 2018), including various socio-demographic factors (e.g. de la Barrera et al., 2016; Neuvonen et al., 2007), accessibility or other supply-side characteristics of UGS, e.g. distance from home (e.g. Schipperijn et al., 2010; Žlender and Ward Thompson, 2017), and users' relation to nature (e.g. Hitchings, 2013; Lin et al., 2014).

However, few studies take an explicit, bottom-up approach to what constrains willingness to use UGS (Hegetschweiler et al., 2017; Wolff et al., 2022). Those that do typically focus either on the use of specific types of UGS (e.g. Theeba Paneerchelvam et al., 2020), at the city-scale or smaller (e.g. Mak and Jim, 2018; Misiune et al., 2021), or rely on small samples (e.g. Hitchings, 2013; McCormack et al., 2010). A key knowledge gap therefore remains concerning what constrains people's usage of UGS more broadly, and how these constraints are perceived by different users. This knowledge is urgently needed to assist urban planners in navigating challenges relating to urban expansion and densification. Moreover, deeper knowledge of constraining factors is particularly relevant in light of the growing socio-economic and cultural heterogeneity in many European cities (e.g. Rutt and Gulsrud, 2016). While UGS is claimed to facilitate social cohesion and reduce loneliness (Enssle and Kabisch, 2020; Peters et al., 2010), several studies have shown that marginalised groups often have less access to UGS compared to more established groups (Haase et al., 2017). Additionally, relatively little is known about how different attributes of UGS encourage or constrain use by people from different cultural backgrounds (Byrne and Wolch, 2009). Urban planners must therefore not only ensure that UGS continues to provide suitable benefits for different urban people, but that it does not inadvertently entrench issues of environmental injustice.

The aim of this paper is therefore to improve understanding of users' perceptions of constraints relating to UGS. The study was conducted in Sweden using an online survey. UGS encompasses a spectrum from natural to human-modified outdoor spaces comprising vegetated areas and water objects of different sizes within urban and peri-urban areas (Taylor and Hochuli, 2017). Our study therefore considers constraints relating to a broad range of urban and peri-urban greenspace types that commonly occur throughout Sweden. We consider constraints as factors that are perceived to directly hinder usage of UGS (e.g. too far away, etc), and also as problems associated with UGS that make its use less satisfying (e.g. litter, etc) (Hadavi and Kaplan, 2016; Misiune et al., 2021). Research questions are: 1) What do people perceive to be the main constraints to using UGS in Sweden? 2) What are the key factors associated with a higher perception of usage constraints?

2. Methodology

2.1. Sweden as a case study

Sweden provides a useful case study of a high-income, post-industrial country with a relatively low population density outside of major city centres, on-going processes of urban densification and a strong tradition of UGS planning. Sweden's national urban development strategy emphasises that UGS should contribute to a more sustainable, healthy and attractive built environment (Swedish Government, 2018). However, tensions between policies for urban densification versus preservation of UGS are currently the subject of intense debate in many Swedish municipalities. Densification has occurred at the expense of UGS, driven by urbanisation trends – 87% of the population now live in urban areas (SCB, 2018) – and by sustainable development policies seeking a more effective use of resources and infrastructure (Boverket, 2019). In addition, like many European countries Swedish society is undergoing rapid demographic and cultural change. Roughly 19% of the current population is now born outside of Sweden, and this is expected to increase to 23% by 2040 (SCB, 2019b). The majority of these new-Swedes live in and around urban centres (SCB, 2020).

Territorial UGS (i.e. excluding water objects) accounts for roughly 63% of urban land area in Sweden (SCB, 2019a). Roughly 40% of this is publicly available, whilst 37% is linked to private gardens or is otherwise inaccessible to the public (SCB, 2019a). Approximately 52% of public UGS are lawns (Hedblom et al., 2017). The largest cities have on average 127 m^2/person of publicly available UGS, compared to 1151 m^2/person in the smallest towns (SCB 2019). Roughly 99% of urban residents in Sweden live within 300 m of one of more green areas $>$ 0.5 ha (SCB 2019).

2.2. Survey

We designed and administered an unrestricted, self-selected online survey (Fricker, 2008). The questionnaire consisted of 11 blocks of closed questions concerning peoples' perceptions and preferences surrounding UGS and 19 closed questions concerning respondents' socio-demographic profile (see Appendix 2 for overview of respondents).

The survey included two questions relating to constraints: "*What prevents you from visiting nature and green areas in and around your town more frequently?*", and "*What kind of problems are there in nature and green areas in and around your town?*". Respondents could select multiple responses from 22 constraints identified from the UGS literature (Table 1), and/or provide free text responses of unlimited length.

The survey was administered using a multi-channel approach to reduce bias. We used several procedures associated with public intercept surveys, including posters in public places throughout Sweden directing respondents to the internet address of the survey. Such efforts are useful for collecting high-quality data for place-based topics, especially when measuring specific events and experiences (Ongena and Haan, 2022). The survey was shared widely via social media, other online platforms and also through direct emails and other contacts with a diverse array of interest groups, including municipalities, Man-and-the-Biosphere reserves, tourist associations, ethnic associations and diverse political parties. These groups were encouraged to spread the survey through their own communication channels.

A total of 2806 respondents from 208 (out of 290) municipalities completed the survey (Fig. 1). Of these, 468 respondents were excluded due to missing data, resulting in N = 2338 (see Appendix 2 for overview of respondents).

Table 1
Constraints grouped into themes.

Constraint Theme	Constraints
Incivilities	Litter
	Vandalism
	Graffiti
	Noisy children and teenagers
Management	Lack of signs; unclear paths
	Overgrown
Accessibility & availability	The area is too far away
	Lack of suitable transport
	Lack of places to visit
Personal issues	Lack of time
	Lack of someone to go together with
	Lack of knowledge about where to go, what to do and see there
	Health issues
	Do not want to
Safety	Feels unsafe
	It is used for criminal activity
	Fire risk
	Dangerous animals or pests
	Danger of injury
	Poisonous plants
No perceived constraints	Nothing stops me
	Do not see any problem

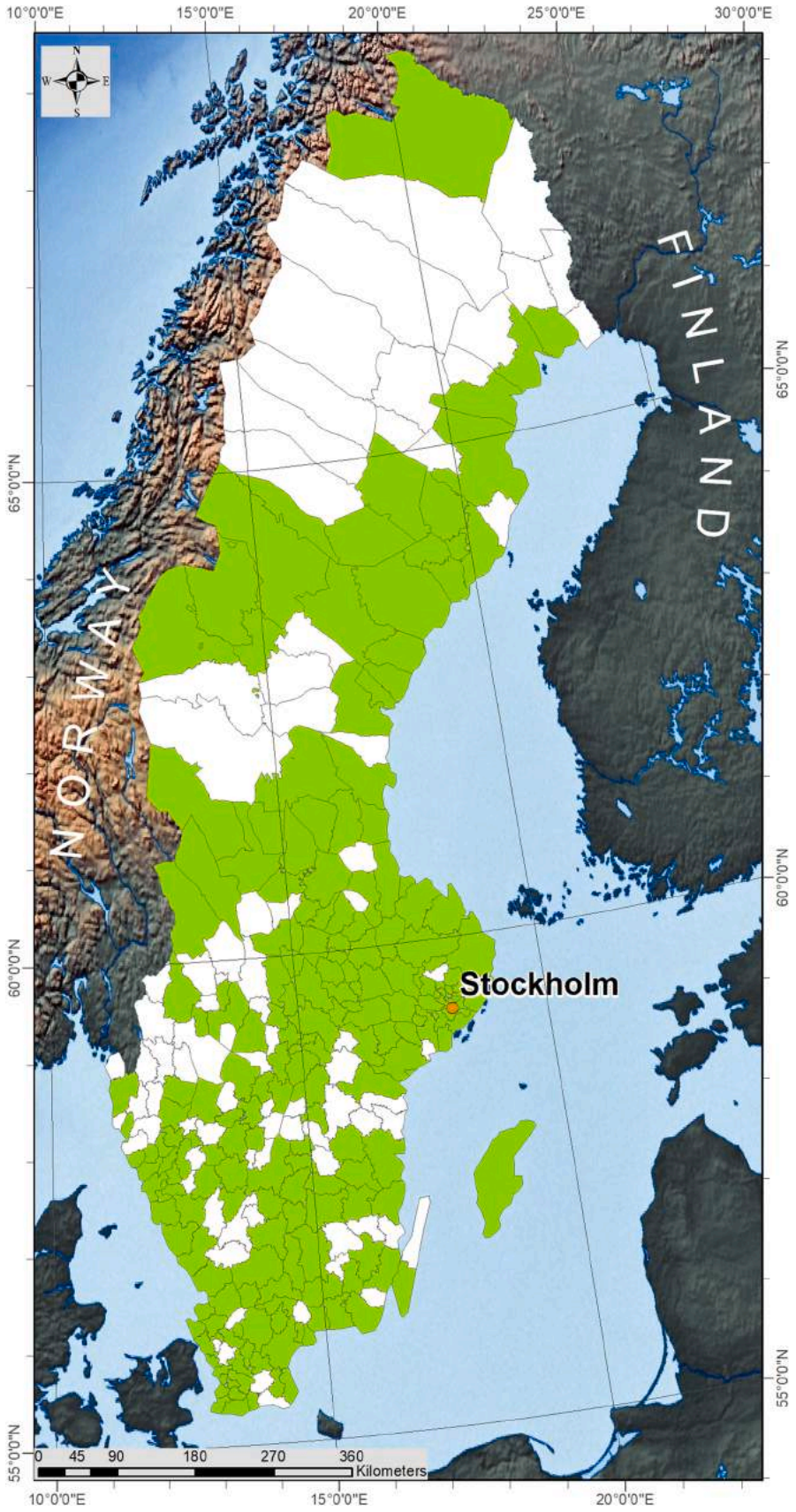

Fig. 1. A total of 2806 people from 208 Swedish municipalities (green) participated in the survey.

2.3. Data analysis

Constraint variables were grouped into six main themes relating to incivilities, management, accessibility and availability, personal issues, safety and no perceived constraints (Table 1), in line with previous studies, e.g., Farahani and Maller (2018), McCormack et al. (2010). Constraint variables were dichotomous ('yes' or 'no') and were assessed against an array of fourteen predictor variables featuring both nominal and ordinal responses, including: *gender, age, marital status, number of children living in the household, education level, self-reported health status, employment status, employment linked to nature, self-reported economic status, country of origin, frequency of UGS use, population density of municipality of residence, distance from home to UGS used most often by respondent, self-reported nature-connectedness*. Multiple binary logistic regression was therefore used to investigate the degree to which perceptions of constraints, or of no constraints, were related to predictor variables. The data was analysed using SAS (SAS, 2018), R and RStudio (R Core Team, 2020).

We combined some very small cohorts to ensure coherent size. For Age we combined 18–20 (n = 23) and 21–30 (n = 255) to become 18–30 (n = 278); for Number of children we combined all values that were three or higher to become 3 + (n=242) as few respondents had more than three children living at home; for Level of education, No formal education (n = 21) and Primary school (n = 87) were combined (n = 108) to become Primary/ formal education; and for Frequency of use, Have no access to such area (n = 5), never (n = 6), and Almost never (n = 42) were combined (n = 53) to become Almost never. For Gender we allowed for three response alternatives – Male, Female and Other – in the survey. However, we received so few responses for Other (n = 19) that this cohort was not analysed concerning gender.

We used composite reliability omega to assess internal consistency, as the items in the scale for self-reported nature-connectedness vary in how strongly they are related to the construct being measured, which violates the tau equivalence requirement for Cronbach ɑ (McNeish, 2018). Since the result (omega = 0.75) was higher than the standard acceptable value of 0.7 (Tavakol and Dennick, 2011) we were able to use the scale including all items.

The questionnaire included many categorical predictor variables. Responses were therefore compared in terms of adjusted odds ratio, i.e., relating to the characteristic of interest while the values of all other variables are held constant (Hosmer and Lemeshow, 2000). Odds ratios were used to determine whether significant ($p < 0.05$) effects in the model were meaningful. We used the following classification to interpret odds ratios: > 1.5 (small effect), > 2 (medium effect), > 3 (large effect) (Sullivan and Feinn, 2012). For negative effects, the multiplicative inverse (1/x) of the classification was used. Given the limitations of the study (see 4.3) we took a conservative approach to the data and only identified factors with medium or large effects as key factors (see Appendix for a complete table of all regression analysis results). For the continuous variables Population density and Nature-connectedness, we calculated the total possible range for the odds ratio (the largest possible difference). These continuous variables were assessed as meaningful if the odds ratio across the total range exceeded the above thresholds.

We used the largest cohort within each predictor variable as the reference for coefficients and odds ratio calculations in the model to ensure consistent interpretation.

We collated free-text responses and grouped them thematically using an iterative open-coding approach (e.g. Saldaña, 2009, p. 8) to identify a set of additional perceived constraints. Some responses included more than one code and were included in multiple themes. For example, one respondent wrote "The city is growing too close to nature areas. Noise pollution." This response was coded as relating to both *encroachment of the built environment* and *noise pollution* constraint themes.

3. Results

3.1. No perceived constraints

In total, 59% of the respondents stated that *nothing prevents me* from using UGS more frequently, while 35% stated that they *see no problems* relating to UGS in their town (Fig. 2).

The logistic regression analysis (Table 2) indicates that younger cohorts were significantly less likely to state *nothing prevents me* compared to the baseline cohort. University graduates were less likely than respondents with primary/no formal education to select this response. Those who lived > 10 km from the UGS they used most often were less likely to state *nothing prevents me* compared to those lived within 0–100 m, as were widowed respondents compared to married respondents. Those who used UGS "almost never" or "once a month" were also less likely to state that *nothing prevents me* than those who used it "several times a week".

Respondents who reported a very low sense of nature-connectedness were more likely to state that they *see no problems* compared to those with a much higher nature-connectedness. Respondents employed on zero-hours contracts were much more likely to *see no problems* compared to fulltime employees, whilst unemployed respondents were significantly less likely to *see no problems* compared to fulltime employees. College graduates were more likely than university graduates to *see no problems* in UGS.

3.2. Perceived constraints

Based on a comparison of average responses across themes, incivilities were the most frequently identified constraint theme (Fig. 2), followed by management issues, and accessibility and availability constraints. On average, personal constraints and safety issues were the least frequently identified constraint themes.

3.2.1. Incivilities

Litter was the most frequently identified problem in UGS and was selected by 53% of respondents, while *vandalism* was selected by 24% of respondents and *graffiti* by 16% (Fig. 2). Nature-connectedness was the only explanatory variable that showed an OR indicating medium or high effect for these incivilities. Respondents with high nature-connectedness were more likely to perceive litter, vandalism and graffiti as problems in UGS compared with those with much lower nature-connectedness (Table 3).

Noisy children/teenagers were reported by 7% of respondents as a problem. Respondents who reported a strong connection to nature were significantly more likely to identify noisy children/teenagers as a problem in UGS compared to those with much lesser nature-connectedness. Younger cohorts and respondents with no children living in their household were also much more likely to identify noisy children/teenagers as a problem in UGS. Retired respondents were less likely than those in fulltime employment to select this constraint.

3.2.2. Management-related constraints

In total, 15% of respondents identified *lack of signs/ unclear paths* as a problem. Respondents living more than 10 km from the UGS that they used most often were more likely to identify this constraint compared to those living within 100 m, as were those living in less dense areas compared to those living in more dense areas (Table 4).

Overgrown greenspace was a problem for 14% of respondents. Those who were "struggling to get by" economically were more likely to perceive UGS as *overgrown* compared to those with a "comfortable" economic situation. Respondents with primary/ no formal education were twice as likely as university graduates to identify *overgrown* greenspace as a problem.

Of the free text responses, 138 responses specified a variety of greenspace *management-related constraints* (Fig. 3), including the

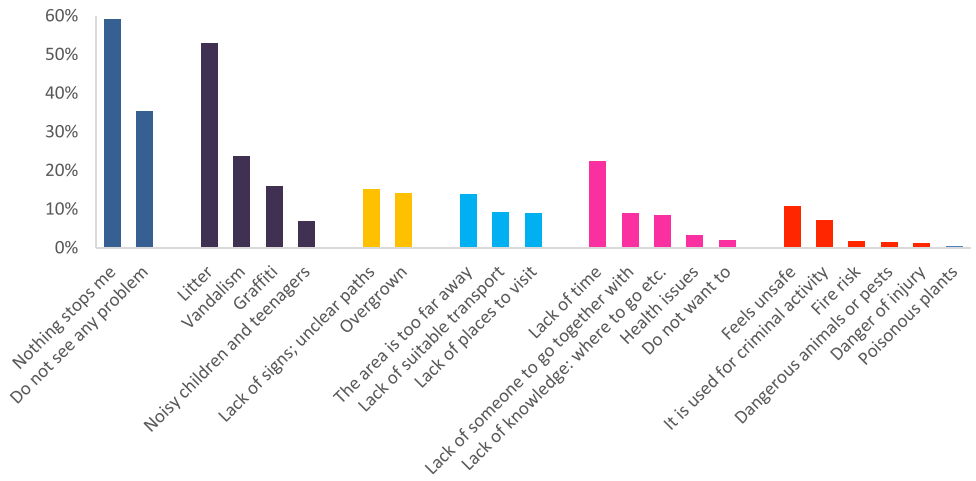

Fig. 2. Frequency of responses per constraint. Constraints are grouped thematically into "No perceived constraints" (dark blue), "Incivilities" (black), "Management-related constraints" (orange), "Accessibility & Availability constraints" (light blue), "Personal constraints" (pink), and "Safety-related constraints" (red).

Table 2
Key factors related to lack of perceived constraints, as identified by the multiple binary logistic regression analysis. All key factors were significant ($p < 0.05$) and had either medium (**) or large effect (***). "[]" indicates response interval values for continuous variables where ORs and Effect are shown over the widest range of values.

Explanatory variable	Coefficient	OR	Effect	95% CI
Nothing prevents me (N = 1655)				
Age				
18–30	-1.00	0.37	* *	0.24–0.56
31–40	-1.06	0.35	* *	0.25–0.48
51–60		1.00		
Level of education				
No formal education / Primary school	0.84	2.31	* *	1.30–4.23
University		1.00		
Marital status				
Widowed	-1.07	0.34	* *	0.18–0.68
Married		1.00		
Frequency of use				
Almost never	-1.33	0.26	* **	0.12–0.56
Once a month	-0.85	0.43	* *	0.29–0.63
Several times a week		1.00		
Distance from home				
0–100 m		1.00		
10 +km	-0.75	0.47	* *	0.26–0.86
See no problems (N = 991)				
Level of education				
College	0.77	2.17	* *	1.20–3.94
University		1.00		
Employment status				
Employed on zero hour contract	1.35	3.84	* **	1.51–10.62
Unemployed	-0.90	0.41	* *	0.19–0.80
Fulltime		1.00		
Distance from home				
0–100 m		1.00		
10 +km	-0.75	0.47	* *	0.25–0.87
Nature-connectedness				
(across widest range of average response values: 2.1–5.0)	[− 0.57]	0.19	* **	[0.46–0.70]

Table 3
Key factors for incivility constraints, as identified by the multiple binary logistic regression analysis. All key factors were significant ($p < 0.05$) and had either medium (**) or large effect (***). "[]" indicates response interval values for continuous variables where ORs and Effect are shown over the widest range of values.

Explanatory variable	Coefficient	OR	Effect	95% CI
Litter (N = 1483)				
Nature-connectedness				
(across widest range of average response values: 2.1–5.0)	[0.48]	3.99	* **	[1.32–1.99]
Vandalism (N = 662)				
Nature-connectedness				
(across widest range of average response values: 2.1–5.0)	[0.52]	4.41	* **	[1.31–2.16]
Graffiti (N = 443)				
Nature-connectedness				
(response interval = 1.0)	0.70	2.01	* *	1.48–2.74
(across widest range of average response values: 2.1–5.0)	[0.70]	7.40	* **	[1.48–2.74]
Noisy children and teenagers (N = 192)				
Age				
18–30	1.48	4.41	* **	2.2–8.89
31–40	1.26	3.52	* **	1.95–6.46
41–50	0.80	2.22	* *	1.23–4.07
51–60		1.00		
Number of children living in household				
0		1.00		
1	-1.52	0.22	* **	0.1–0.43
2	-0.80	0.45	* *	0.26–0.76
3 +	-0.89	0.41	* *	0.19–0.81
Employment status				
Fulltime		1.00		
Retired	-1.07	0.34	* *	0.13–0.89
Nature-connectedness				
(across widest range of average response values: 2.1–5.0)	[0.60]	5.60	* **	[1.18–2.89]

perceived insufficiency of infrastructure and facilities such as toilets, parking, lighting, benches, barbecue facilities, paths and signs. Several respondents also connected the lack of desired infrastructure with the COVID-pandemic. For example, one wrote "there are not enough tables and benches where one can maintain distance from each other and from passers-by." On the other hand, 24 free text responses identified that the *over-management* of UGS was, for them, a constraint. For example, several respondents wrote that nature areas had become "tame", "artificial," "over-lit" recreation areas, where all "wild" elements had been removed in the name of safety. This reduced their enjoyment. Additionally, many management-related responses referred to the need for improved maintenance of greenspace and facilities.

Table 4
Key factors for management-related constraints, as identified by the multiple binary logistic regression analysis. All key factors were significant ($p < 0.05$) and had either medium (**) or large effect (***). "[]" indicates response interval values for continuous variables where ORs and Effect are shown over the widest range of values.

Explanatory variable	Coefficient	OR	Effect	95% CI
Lack of signs/ unclear paths (N = 421)				
Distance from home				
0–100 m		1.00		
10 +km	0.80	2.22	* *	1.13–4.19
Population density of municipality of residence				
(widest range of response values: 0.7–6076.1 pers/km2; smallest meaningful difference in densities: 4058 pers/km2)	[− 0.0001]	0.35	* *	[0.99–1.00]
Overgrown (N = 391)				
Level of education				
No formal education / Primary school	0.79	2.21	* *	1.23–3.90
University		1.00		
Economic status				
Struggling to get by	0.91	2.49	* *	1.32–4.58
Reasonably comfortable		1.00		

3.2.3. Accessibility and availability constraints

Amongst the accessibility and availability constraints, 14% of respondents stated that UGS was *too far away*, 9% stated that they *lacked suitable transport*, whilst 9% said they *lacked places to visit*. Distance to greenspace was explanatory for each of these constraints (Table 5). Respondents who lived further from the greenspace they used most often were generally more likely to identify all three of these constraints compared to those who lived closest. Respondents aged 18–40 yrs were also more likely to identify all three of these constraints compared to the reference age cohort 51–60 yrs.

Respondents who identified strongly with nature were more likely to state that UGS was *too far away* compared to those with much lower nature-connectedness. Respondents with primary/ no formal education were less likely than university graduates to feel that UGS was too far away.

Respondents living in more densely populated areas were more likely to identify *lack of suitable transport* as a constraint compared to those living in less dense areas. Those who almost never used UGS were more likely to perceive lack of transport as a constraint compared with those who used it several times a week, as were widowed respondents compared to married respondents.

As well as younger cohorts and those who lived further from UGS, those in "poor" health were much more likely to select *lack of places to visit* compared to those in "good enough" health. As with *lack of suitable transport*, those who almost never used UGS were much more likely to identify lack of places to visit as a constraint compared with those who used UGS several times a week.

Of the free text responses, 130 concerned *accessibility and availability constraints* (Fig. 3). Many of these regarded the perceived inadequacy of available UGS, especially compared to the number of users. For example, one respondent wrote "[UGS is] generally worn-down as there are too few green areas in relation to the population." Many other responses stated that green areas were too far away and required a car to reach them, and/or that public transport connections to these areas were insufficient. Several responses dealt with the lack of cycle-paths to UGS, and the difficulties faced by people with physical disabilities in accessing these areas. Some responses also concerned conflicts between the Swedish "right of public access" (Allemansrätten) and the rights of private landowners.

3.2.4. Personal constraints

In total, 22% of respondents identified *lack of time* as a reason preventing them from using UGS more frequently than they did. Those aged 18–30 yrs were more likely to identify lack of time compared to those aged 51–60 yrs, as were those with 3 or more children living in the household compared to those with no children in the household (Table 6). Respondents in full-time employment were significantly more likely than retired, self-employed and unemployed respondents to choose this constraint. Respondents who only used UGS once a month were more likely to select lack of time compared to the reference cohort who used UGS several times a week.

Lack of someone to go together with was selected by 9% of respondents. Less frequent users were also more likely to identify this constraint. Married respondents were less likely to identify lack of someone to go together with as a constraint compared to single and divorced respondents, as were fulltime employees compared to those employed on zero-hours contracts. Those with a strong sense of nature-connectedness were much less likely than those with a weak connection to nature to select this constraint.

Lack of knowledge about where to go, what to do and see there was selected by 8% of respondents. Cohorts aged 18–40 yrs were more than three times as likely to identify this constraint compared to those aged 51–60 yrs. Respondents in "rather poor" health were twice as likely as those in "good enough" health to identify this constraint. Less frequent users were also much more likely than those who used UGS several times a week to select this constraint.

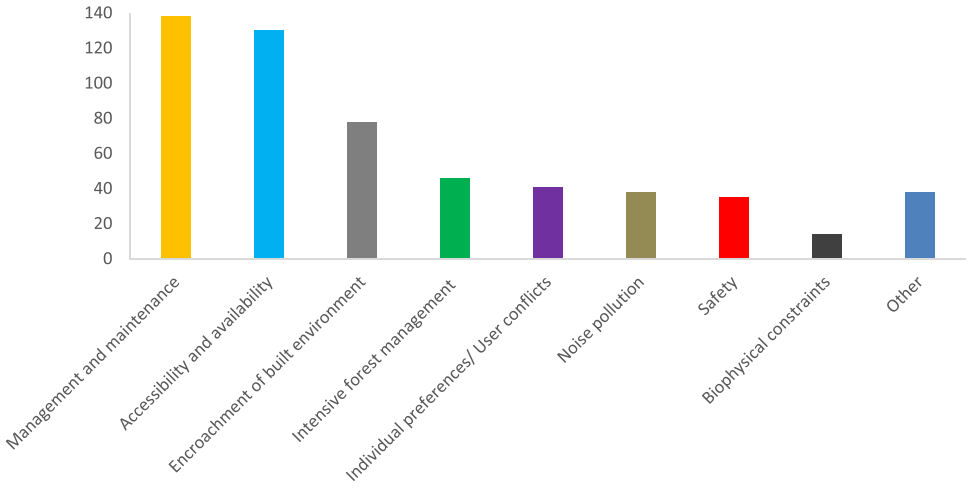

Fig. 3. Frequency of constraint themes identified from free-text responses. Many responses were coded as relating to more than one theme.

Table 5
Key factors for accessibility and availability constraints, as identified by the multiple binary logistic regression analysis. All key factors were significant ($p < 0.05$) and had either medium (**) or large effect (***). "[]" indicates response interval values for continuous variables where ORs and Effect are shown over the widest range of values.

Explanatory variable	Coefficient	OR	Effect	95% CI
The area is too far away (N = 388)				
Age				
18–30	0.87	2.40	* *	1.38–4.13
31–40	1.07	2.92	* *	1.92–4.46
51–60		1.00		
Level of education				
No formal education / Primary school	-0.96	0.38	* *	0.15–0.86
University		1.00		
Distance from home				
0–100 m		1.00		
300–1000 m	0.97	2.63	* *	1.74–4.03
1–10 km	1.42	4.13	* **	2.66–6.50
10 +km	2.23	9.25	* **	4.66–18.30
Nature-connectedness				
(across widest range of average response values: 2.1–5.0)	[0.37]	2.89	* *	[1.06 – 2.00]
Lack of suitable transport (N = 254)				
Age				
18–30	1.31	3.70	* **	1.88–7.25
31–40	1.32	3.74	* **	2.2–6.48
51–60		1.00		
Marital status				
Married		1.00		
Widowed	1.18	3.25	* **	1.22–7.91
Frequency of use				
Almost never	0.95	2.59	* *	1–6.19
Several times a week		1.00		
Distance from home				
0–100 m		1.00		
1–10 km	1.02	2.78	* *	1.67–4.69
10 +km	1.77	5.86	* **	2.61–12.79
Population density of municipality of residence				
(widest range of response values: 0.7–6076.1 pers/km2; smallest meaningful difference in densities: 3584 pers/km2)	0.00	3.24	* **	NA
Lack of places to visit (N = 246)				
Age				
18–30	0.96	2.61	* *	1.35–4.98
31–40	0.98	2.66	* *	1.61–4.43
51–60		1.00		
Health				
Poor	1.45	4.26	* **	1.09–15.37
Good enough		1.00		
Frequency of use				
Almost never	1.65	5.22	* **	2.28–11.57
Several times a week		1.00		
Distance from home				
0–100 m		1.00		
1–10 km	0.84	2.32	* *	1.43–3.78
10 +km	1.13	3.09	* **	1.33–6.84

Health issues were identified as a constraint by 3% of respondents. Unsurprisingly, self-reported health status was a strongly explanatory variable for this constraint. For example, those in "poor" health were 40 times more likely to select this constraint compared to those in "good enough" health. Similarly, respondents on long-standing sick leave were much more likely than fulltime employees to identify *health* issues as a constraint, as were those who reported their employment status as "Other". Respondents who used UGS every day were less likely than those who used it several times a week to select health issues. Those who

Table 6
Key factors for personal constraints, as identified by the multiple binary logistic regression analysis. All key factors were significant ($p < 0.05$) and had either medium (**) or large effect (***). "[]" indicates response interval values for continuous variables where ORs and Effect are shown over the widest range of values.

Explanatory variable	Coefficient	OR	Effect	95% CI
Lack of time (N = 628)				
Age				
18–30	0.89	2.44	* *	1.57–3.81
51–60		1.00		
Number of children living in household				
0		1.00		
3 +	0.70	2.01	* *	1.36–2.96
Employment status				
Fulltime		1.00		
Retired	-2.11	0.12	* **	0.05–0.27
Self-employed	-0.76	0.47	* *	0.29–0.74
Unemployed	-0.80	0.45	* *	0.20–0.93
Frequency of use				
Once a month	0.84	2.32	* *	0.39–0.70
Several times a week		1.00		
Lack of someone to go with (N = 248)				
Marital status				
Married		1.00		
Divorced	0.99	2.70	* *	1.37–5.09
Single	1.20	3.33	* **	2.14–5.2
Employment status				
Fulltime		1.00		
Employed on zero hour contract	1.45	4.25	* **	1.39–12.09
Frequency of use				
Once a month	1.08	2.93	* *	1.72–4.92
Once a week	0.72	2.05	* *	1.32–3.15
Several times a week		1.00		
Nature-connectedness				
(across widest range of average response values: 2.1–5.0)	[− 0.38]	0.34	* *	[0.48–0.98]
Lack of knowledge about where to go, what to do and see there (N = 235)				
Age				
18–30	1.27	3.55	* **	1.82–6.89
31–40	1.12	3.06	* **	1.82–5.24
51–60		1.00		
Health				
Rather poor	0.71	2.04	* *	1.05–3.79
Good enough		1.00		
Frequency of use				
Almost never	1.14	3.12	* **	1.18–7.45
Once a month	1.17	3.21	* **	1.85–5.46
Once a week	0.98	2.68	* *	1.73–4.11
Several times a week		1.00		
Health issues (N = 92)				
Health				
Poor	3.69	40.11	* **	9.3–181.23
Rather poor	1.95	7.04	* **	3.36–14.63
Good enough		1.00		
Very good	-1.38	0.25	* **	0.1–0.56
Employment status				
Fulltime		1.00		
Long-standing sick leave	1.42	4.14	* **	1.06–15.04
Other	1.37	3.93	* **	1.07–13.36
Frequency of use				
Several times a week		1.00		
Every day	-0.89	0.41	* *	0.19–0.85
Distance from home				
0–100 m		1.00		
300–1000 m	-0.98	0.37	* *	0.17–0.82
Nature-connectedness				
(response interval = 1.0)	-0.82	0.44	* *	0.24–0.82
(across widest range of average response values: 2.1–5.0)	[− 0.82]	0.09	* **	[0.24–0.82]

(*continued on next page*)

Table 6 (*continued*)

Explanatory variable	Coefficient	OR	Effect	95% CI
Do not want to (N = 52)				
Age				
31–40	1.69	5.44	* **	1.37–28.46
51–60		1.00		
Country of origin				
Born in Sweden		1.00		
Born outside of Sweden	1.02	2.76	* *	1.09–6.7
Frequency of use				
Almost never	2.81	16.61	* **	4.64–59.65
Once a month	1.31	3.70	* **	1.3–10.23
Several times a week		1.00		
Nature-connectedness				
(response interval = 1.0)	-1.41	0.24	* **	0.13–0.46
(across widest range of average response values: 2.1–5.0)	[− 1.41]	0.02	* **	[0.13–0.46]

lived 300–1000 m from the UGS they used most often were also less likely than those who lived 0–100 m to perceive *health issues* as a constraint. Finally, those with a weaker nature-connectedness were also much more likely to select *health issues* compared to those who most strongly identified with nature.

Only 2% answered that they *did not want to visit* urban nature and greenspace more frequently than they currently did. The least frequent users of UGS were much more likely to select this constraint than those who used it several times a week. Respondents with a weaker nature-connectedness were much more likely to select *do not want to visit* compared to those with a stronger sense of connection to nature, as were respondents aged 31–40 yrs compared to those aged 51–60. Those born outside of Sweden were also more likely to select this response compared to those born in Sweden.

3.2.5. Safety-related constraints

11% of respondents reported that UGS *feels unsafe*. Male respondents were less likely to feel unsafe in UGS compared to females (Table 7). Those who almost never visited UGS were much more likely to feel unsafe there than those who used it several times a week.

The least frequent users of UGS were also much more likely to state that these areas were used for *criminal activity*, which was identified as a problem by a total of 7% of respondents. Unemployed respondents were more likely than fulltime employees to perceived criminal activity, whilst retirees were less likely than fulltime employees to do the same. Those who lived 1–10 km from the UGS they used most frequently were less likely to perceive criminal activity in UGS compared to those who lived within 0–100 m.

Only 2% of respondents were concerned about the *fire risk* in UGS, 1% were reported that *dangerous animals and pests* were a problem, 1% were worried about the *danger of injury* in UGS, and far fewer than 1% reported *poisonous plants* as a safety concern. Those who almost never visited UGS were much more likely than those who used it several times a week to perceive a fire risk in these areas. Respondents with a weaker nature-connectedness were much more likely than those with a stronger identification with nature to perceive *dangerous animals or pests* as a problem in UGS. This constraint was also more likely to be selected by single respondents compared to married respondents, and by females compared to males. No explanatory variables were found for *danger of injury* or *poisonous plants*.

Safety issues were a concern in 35 of the free text responses (Fig. 3). Many of these comments dealt with fear of attack, especially after dark, or otherwise concerned the use of UGS for the sale and/or consumption of illegal drugs. Several responses also concerned a fear of dangerous animals including wolves, wild pigs, bulls, rams, geese and horses. Other safety concerns included risk of injury, for example from falling trees.

Table 7
Key factors for safety-related constraints, as identified by the multiple binary logistic regression analysis. All key factors were significant ($p < 0.05$) and had either medium (**) or large effect (***). "[]" indicates response interval values for continuous variables where ORs and Effect are shown over the widest range of values.

Explanatory variable	Coefficient	OR	Effect	95% CI
Feels unsafe (N = 304)				
Gender				
Female		1.00		
Male	-0.87	0.42	* *	0.29–0.59
Frequency of use				
Almost never	1.23	3.42	* **	1.5–7.44
Several times a week		1.00		
It is used for criminal activity (N = 201)				
Employment status				
Fulltime		1.00		
Retired	-0.84	0.43	* *	0.2–0.93
Unemployed	0.86	2.36	* *	1.07–4.94
Frequency of use				
Almost never	1.96	7.12	* **	2.88–16.7
Once a month	0.87	2.38	* *	1.23–4.4
Several times a week		1.00		
Distance from home				
0–100 m		1.00		
1–10 km	-1.04	0.35	* *	0.18–0.64
Fire risk (N = 44)				
Frequency of use				
Almost never	1.95	6.99	* **	1.25–30.47
Several times a week		1.00		
Dangerous animals or pests (N = 41)				
Gender				
Female		1.00		
Male	-1.10	0.33	* **	0.11–0.86
Marital status				
Married		1.00		
Single	1.44	4.20	* **	1.29–13.62
Nature-connectedness				
(response interval = 1.0)	-1.02	0.36	* *	0.16–0.85
(across widest range of average response values: 2.1–5.0)	[− 1.02]	0.05	* **	[0.16–0.85]

3.2.6. Summary of free text constraints provided under "Other"

Of the 2752 respondents who completed the constraints section of the survey, 517 (≈19%) selected "other" and provided free text comments. These included 78 comments that identified the *encroachment of the built environment* upon UGS as a constraint to their use and/or enjoyment of UGS (Fig. 3). Most of these comments concerned perceived negative impacts of municipal densification or exploitation plans. Several respondents also wrote that built elements, particularly busy roads and industrial estates, posed physical barriers for their access to UGS. *Intensive forest management practices* were specifically mentioned as a constraint in 46 responses. Clear-cuts were frequently identified as undesirable, whilst the destruction of paths and small roads by forest machines were also identified as problematic for UGS users.

Constraints relating to *user preferences and/or conflicts with other users* were identified in 41 comments, e.g. unleashed dogs or the use of walking paths by mountain-bikers.

Concerns regarding the impact of *noise pollution* on the use of UGS was a theme in 38 comments. Whilst these comments were overwhelmingly traffic-related, several respondents also suggested that noise from large events, such as illegal raves, was a problem in their UGS. *Biophysical factors* were mentioned in 14 comments, mainly concerning the impact of bad weather and/or the long, dark Swedish winter on use of UGS. A further 18 comments dealt with *other perceived constraints* ranging from the presence of wind-power turbines to the use of

greenspace for outdoor sexual liaisons or for illegal camps by displaced people.

4. Discussion

4.1. Overview of key findings

4.1.1. Main perceived constraints to urban greenspace usage in Sweden

Our study showed that the most commonly perceived constraints in Sweden are *litter*, *vandalism*, and *lack of time*. These are frequently identified as important issues in many studies across different contexts (e.g., Bedimo-Rung et al., 2005; Gidlow and Ellis, 2011; Holt et al., 2019; Mak and Jim, 2019; McCormack et al., 2010; Siba et al., 2020; Sreetheran and van den Bosch, 2014; Tzoulas and James, 2010). One likely explanation is that incivilities such as litter and vandalism are highly visible phenomena to which users are incontrovertibly exposed, in comparison with more intangible, ephemeral phenomena such as feeling unsafe. It is also possible that littering and vandalism occurred more frequently in UGS during the period that our survey was conducted due to increased usage during the COVID-19 pandemic (e.g. Spennemann, 2021). At the same time, expectations of serenity are important for UGS users in Sweden (e.g. Grahn and Stigsdotter, 2010), and litter and vandalism may be widely perceived as problems in Sweden because they disturb such expectations. Although our findings concerning *lack of* time may be partly influenced by the relatively large proportion of full-time employees among our respondents, previous studies in different contexts have shown that lack of time is a common factor across different groups (Holt et al., 2019; Žlender and Ward Thompson, 2017).

On the other hand, relatively few of our respondents perceived accessibility, availability, or safety concerns as constraints. *The area is too far away* and *feeling unsafe* were ranked 9th and 10th (out of 22 constraints) respectively in terms of selection frequency, whilst other safety and accessibility/availability constraints were ranked even lower. Our results here contrast with many previous studies, where these are perhaps the most frequently discussed issues (e.g., Gidlow and Ellis, 2011; Hegetschweiler et al., 2017; Sreetheran and van den Bosch, 2014; Theeba Paneerchelvam et al., 2020). The role of context in this regard remains unclear. One explanation could be that UGS are generally more available and accessible in Nordic countries than in many other contexts, and are typically considered safe (Jansson et al., 2013). For example, Weimann et al. (2017) found that an overwhelming proportion of respondents in southern Sweden perceived UGS to be safe. In Denmark, Schipperijn et al. (2010) identified a negative correlation between increased distance and use of UGS, but at the same time suggested that distance was unlikely to be a limiting factor as most people lived relatively close to UGS. It is also possible that our results in this regard are influenced by a bias towards more frequent users amongst our respondents (see 4.3). Our findings indicate, for example, that less frequent users are much more likely to perceive several safety constraints and some availability/ accessibility constraints than frequent users. However, Misiune et al. (2021) found that distance was the major constraint for UGS users in Vilnius, Lithuania, regardless of frequency of use.

4.1.2. Key factors associated with perception of constraints

Our study indicates that perceptions of constraints are multi-dimensional constructs explained by multiple factors, *sensu* Balram and Dragićević (2005). We identified four key factors that appear to have a particularly strong influence on perceptions of multiple constraints in Sweden: age, nature-connectedness, distance to greenspace, and frequency of use.

First, our results show that younger adult users, especially 18–40 yrs, were more likely to perceive accessibility/availability constraints compared to older users. This may indicate that younger adults have less access to UGS. Fagerholm et al. (2022) recently found that younger people in urban environments in Nordic countries often live in less green surroundings compared to older cohorts. It is also possible that younger people have different sets of expectations regarding quality, accessibility or availability and/or that these expectations are more influenced by personal circumstances e.g., greater responsibility for small children. Our results show, for example, that younger respondents were also more likely to identify several personal constraints compared to older cohorts, including lack of time. UGS may therefore be perceived as less accessible by young adults due to greater time constraints. Several earlier studies have found important differences in UGS usage in the Nordic region based on age, including that older people use UGS more frequently (Neuvonen et al., 2007; Schipperijn et al., 2010), and pursue a greater number of activities and perceive a wider range of aesthetic benefits related to UGS than younger people (Ode Sang et al., 2016).

Second, nature-connectedness affects perception of personal and incivility constraints. Respondents with a stronger connection with nature were much more likely to perceive incivility constraints. Lin et al. (2014) show that nature-connectedness is a strong driver of people's UGS preferences. We assume that those who feel a stronger affinity for nature also have stronger preferences for "unspoiled", "natural" UGS environments (e.g. Grahn and Stigsdotter, 2010), which are more easily disturbed by the presence of incivilities. On the other hand, respondents with a weaker sense of connection to nature were more likely to select personal constraints such as *health issues* or *lack of someone to go together with*. These respondents were also much more likely to state that they *do not want to visit* UGS, although relatively few actually selected this response. One explanation might be that those with a weaker connection to nature are less motivated to visit UGS and therefore have a lower threshold for finding reasons not to go. For example, Theeba Paneerchelvam et al. (2020) highlighted that women preferred to say that they were too busy rather than express a disinterest in visiting UGS. Alternately, it is possible that users with a weaker sense of connection to nature perceive UGS as more of a social space, i.e., for meetings and other social activities (Phillips et al., 2022). For such users, the absence of someone to go together with may constitute a logical constraint.

Third, people perceive more usage constraints if they live further from the UGS that they use the most and distance appears to influence perceptions of constraints more generally. For example, our study shows that those who live closest to the UGS that they use most often are more likely to perceive fewer or no constraints.

Fourth, we found a similar relationship concerning frequency of use – more frequent users were more likely to state that nothing stops them from using UGS, whilst less frequent users were more likely to perceive several accessibility/ availability and safety-related constraints. Previous studies have shown strong links between distance and frequency of UGS usage in Europe (Misiune et al., 2021; Schipperijn et al., 2010; Žlender and Ward Thompson, 2017). Elbakidze et al. (2022) recently showed that people in Sweden use UGS more frequently if it is within walking distance of home. However, several of our results problematise a straight-forward overlap between distance and frequency of use, at least concerning perception of constraints. For example, those who live closest to UGS were more likely to perceive *criminal activity* as a problem in UGS, whereas frequent users were much less likely to perceive this constraint compared to infrequent users. Similarly, frequent users were less likely to identify *health issues* as a constraint, but those who lived closest to the UGS that they preferred were more likely to cite health constraints than those who lived further away. These results indicate that relationships between distance and usage may be more nuanced than previous studies indicate. Unlike distance, frequency of use was also strongly linked with other personal constraints, such as a *lack of time*, *lack of someone to go together with*, and *lack of knowledge about where to go and what to do there*.

4.2. Planning implications

4.2.1. Ensuring adequate supply of available, accessible urban greenspace

Issues of availability and accessibility are a core focus of UGS planning and are increasingly recognised in policy objectives for urban planning at multiple levels (e.g., Swedish Government, 2018; United Nations, 2015, 2017). In Sweden, the national environmental objective "a good built environment" identifies adequate supply of high quality and accessible nature and green areas in close proximity to built areas as a key target (Boverket, 2019). The availability and accessibility of UGS has traditionally played an important role in urban planning in Nordic countries (Fagerholm et al., 2022), which are often highly ranked in this respect compared to most other European countries (e.g., European Commission, 2016). For example, most urban residents in Sweden have access to UGS within close proximity of their homes (SCB, 2019a). At first glance, our results appear to confirm the adequacy of supply of UGS in Sweden – a high proportion of respondents perceive few or no constraints relating to usage of UGS. However, our survey received many free text comments suggesting that UGS in Sweden is inadequate given the large number of people that wish to use it, and that the UGS that people want to use the most is often inaccessible without a car. We also found that many Swedish people identify constraints relating to *encroachment of the built environment* and *intensive forest management practices*.

Taken together, these findings highlight the increasing challenges facing urban planners due to ongoing demographic trends, including urbanisation and population growth (Swedish Government, 2018), and appear to be at odds with global policy ambitions supporting increasingly compact cities e.g., the New Urban Agenda (United Nations, 2017). Increasing pressure on, and congestion in, UGS is already an explicit concern in Sweden and other Nordic countries (Boverket, 2019; Fagerholm et al., 2022), where a mostly adequate supply of UGS risks "death by a thousand cuts" due to continued expansion and densification of the built environment. In terms of what needs to be done, our results are largely congruent with proposals made by Fagerholm et al. (2022) and Elbakidze et al. (2022) concerning the need to preserve and enhance both large peri-urban UGS, such as forests and nature reserves where there is sufficient space for larger numbers of users, and smaller, more centrally located UGS such as pocket parks. Zinko et al. (2018) go further and suggest that it is necessary to create and/or restore nature areas to ensure the integration of existing UGS into functional networks of green infrastructure. Wolff et al. (2022) warn, however, that physical interventions to reduce availability and accessibility constraints are often institutionally complex and impeded by lack of cross-sectoral cooperation.

4.2.2. Maximising societal benefits of UGS

For societies to reap its many benefits, UGS must not only be available and accessible but people must choose to visit it (Hitchings, 2013; Lin et al., 2014). The prominence of incivilities and management-related constraints among our results suggests that significant improvements to UGS usage in Sweden and similar contexts might be made through management-level interventions. Such interventions might include education and prevention programs aimed at litter, vandalism and graffiti, quicker response rates to rectify these problems when they do occur, and improved signage and pathways. Yet our results also indicate that certain groups are less likely to want to visit UGS and/or more likely to perceive a range of personal constraints relating to use of UGS, including *lack of time*, *lack of knowledge about where to go and what to do there*, and *lack of someone to go with*. While restoration of UGS on brownfield sites can offer a suite of social and economic benefits (Dawson et al., 2017), increasing the availability of UGS may be difficult in many contexts. In this light, efforts to address personal constraints, such as lack of knowledge about local UGS or lack of company, may offer low-hanging fruit. For example, the development of a range of open, group-based activities may address constraints concerning the lack of company and stimulate social contacts and integration between different groups. Such efforts may be useful for targeting infrequent users, who are more likely to perceive such constraints. Information/education campaigns aimed at younger people may also be particularly important in this regard. Our study indicates that younger adults in Sweden perceive a wide range of constraints, including personal constraints. Studies have shown that interest and engagement in the natural world is in decline amongst younger generations, coinciding with the rise of digital social and recreational activities (Akpınar, 2020; Edwards and Larson, 2020; Oppliger et al., 2019). There is a need for education policies that expose young people to the natural environment and foster an engagement in nature (Ives et al., 2017a, 2017b; Lin et al., 2014). This is especially important given that an engagement in nature is seen as a societal prerequisite for meeting climate challenges. More broadly, there is a need for deeper understanding of the personal and/or psychological drivers amongst different groups.

In contrast to several recent studies (Basu and Nagendra, 2021; de la Barrera et al., 2016; Haase et al., 2017; Hughey et al., 2016), we found few strong relationships linking potential indicators of socio-economic marginalisation – e.g. low economic status, born outside of Sweden, low education level – with increased perception of constraints. In several instances, these relationships pointed in the opposite direction. For example, people with primary/no formal education were more likely to state that nothing prevented them from using UGS, and less likely to state that UGS was too far away, compared to university graduates. While perhaps partly explained by the relative ubiquity and high quality of UGS in Sweden, these results indicate that relationships between perceived constraints and issues of environmental justice may not be straightforward, at least in Sweden and similar contexts. Given the rapid rate of demographic and cultural change in many societies today, and the growing interest in the role of multifunctional UGS for supporting social cohesion (Leikkilä et al., 2013; Peters et al., 2010), our results here indicate a need for further studies to ensure that efforts to promote the use of UGS do not inadvertently lead to an uneven distribution of constraints and thereby prevent the very cohesion they intend to enhance (e.g. Mak and Jim, 2018). Additionally, although many policies to date focus on the health benefits of using UGS, there is a need for policies that promote a wider range of social and cultural benefits linked to UGS. These policies need to be tailored towards specific target groups, given the wide range of preferences that different groups have concerning UGS (Elbakidze et al., 2022).

Finally, our findings highlight that different groups of users may have starkly divergent perceptions of constraints relating to UGS. This strengthens arguments from recent studies regarding a need to integrate multiple perspectives in UGS planning (e.g. Hegetschweiler et al., 2022; Weimann et al., 2019), and to promote the engagement of local communities (Haaland and van den Bosch, 2015; Wolff et al., 2022). In this regard, the improved integration of younger adult perspectives and further exploration of the perspectives of infrequent users appears particularly salient. However, at least in Sweden, the effectiveness of dialogue and collaboration processes concerning planning of UGS to date has been questioned (Boverket, 2019; Lundberg et al., 2012) and there is a clear need for additional resources to integrate new user perspectives, and, crucially, for a broader diversity of perspectives amongst planners themselves (Elbakidze et al., 2015, 2022).

4.3. Limitations of the study

Our data was collected using a variety of nonprobability sampling methods, i.e., a network sample with initial contacts through professional networks and a public intercept survey. These methods do not systematically target all sections of a population. As a result, not all individuals have the same chance of selection. Although the impact of non-probability sampling on our results is difficult to assess, we were aware that, e.g., the initial use of authors' personal and professional networks to spread the online survey may bias the sample in terms of

education level. Our study therefore employed multiple sampling procedures to mitigate such biases (see 2.2). Despite these measures, our sample was biased towards more frequent users of green space. Results for constraints with very small subsamples (e.g. *risk of fire*, *dangerous animals or pests* and *poisonous plants*) should therefore be interpreted with caution. Additionally, responses were not presented in random order. In web surveys with visually presented response alternatives, respondents are more likely to choose one of the first alternatives i.e., primacy effect (Galesic et al., 2008). While our data did not show primacy effects, as constraints listed earlier were not more likely to be endorsed than constraints lister later, we do not know what the level of endorsement would have been in case of randomized order. Finally, some constraint themes may be argued to overlap, particularly concerning incivilities, safety and management issues. In this study we have largely followed thematic classifications established by previous studies (above) to enable future comparative analyses. The classification scheme and the number and diversity of constraints within a given theme may impact results comparing average responses across themes. This highlights the need for future studies to carefully consider how constraints should be defined and classified.

5. Conclusions

The present study represents the most comprehensive investigation into UGS usage constraints to date and makes important contributions to what is previously understood. We used data from an online survey to explore perceived constraints to UGS usage in Sweden. Overall, we found that most respondents perceived few or no constraints. Incivilities were the most identified constraint theme followed by management-related constraints. Despite their prominence in the literature, safety-related and accessibility/availability constraints were not strongly identified amongst our respondents, which were skewed towards more frequent users. We showed that several key factors – including age, nature-connectedness, distance to greenspace, and frequency of use – were strongly associated with a heightened likelihood of perceiving different constraint themes. Alongside constraints previously identified in the literature, our survey revealed additional constraints, including the perceived encroachment of the built environment and the negative impact of intensive forest management regimes.

Our findings deepen current knowledge regarding UGS usage and highlight a need to integrate multiple perspectives in UGS planning to counteract growing social inequalities and promote social cohesion. However, our study also shows the need for further research to navigate conflicts between global policy ambitions supporting increasingly compact cities (e.g. New Urban Agenda) and national level environmental objectives concerning good-quality and accessible natural areas and green spaces.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.ufug.2023.127865.

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