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Acceptance of near-natural greenspace management relates to ecological and socio-cultural assigned values among European urbanites

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Abstract

Grasslands are widespread elements of urban greenspace providing recreational, psychological and aesthetic benefits to city residents. Two urban grassland types of contrasting management dominate urban greenspaces: frequently mown, species-poor short-cut lawns and less intensively managed, near-natural tall-grass meadows. The higher conservation value of tall-grass meadows makes management interventions such as converting short-cut lawns into tall-grass meadows a promising tool for urban biodiversity conservation. The societal success of such interventions, however, depends on identifying the values urban residents assign to different types of urban grasslands, and how these values translate to attitudes towards greenspace management. Using 2027 questionnaires across 19 European cities, we identify the assigned values that correlate with people's personal greenspace use and their preferences for different types of urban grasslands to determine how these values relate to the agreement with a scenario of converting 50% of their cities' short-cut lawns into tall-grass meadows. We found that most people assigned nature-related values, such as wildness, to tall-grass meadows and utility-related values, such as recreation, to short-cut lawns. Positive value associations of wildness and species richness with tall-grass meadows, and social and nature-related greenspace activities, positively correlated with agreeing to convert short-cut lawns into tall-grass meadows. Conversely, disapproval of lawn conversion correlated with positive value associations of cleanliness and recreation potential with short-cut lawns. Here, people using greenspaces for nature-related activities were outstandingly positive about lawn conversion. The results show that the plurality of values assigned to different types of urban grasslands should be considered in urban greenspace planning. For example, tall-grass meadows could be managed to also accommodate the values associated with short-cut lawns, such as tidiness and recreation potential, to support their societal acceptance.

Keywords: Urban biodiversity conservation; Lawn management; Nature-related values; Urban grasslands; Ecological restoration; Socio-ecological systems; Green infrastructure; Urban greenspace

Introduction

Urban greenspace is central in providing nature experiences, well-being and recreation for an increasing proportion of the world's population (Dunn, Gavin, Sanchez & Solomon, 2006; Soga & Gaston, 2016). One of the most common vegetation types in urban greenspaces worldwide are grasslands (Hedblom, Lindberg, Vogel, Wissman & Ahrné, 2017; Ignatieva, Eriksson, Eriksson, Berg & Hedblom, 2017). Two main types of such grasslands may be distinguished based on their management intensity: frequently mown *short-cut lawns*, and less-intensively managed, near-natural *tall-grass meadows.* Owing to their intensive management, short-cut lawns are generally expensive to manage and provide habitat for a limited number of taxa (Norton et al., 2019) but are important for urban recreation (Ignatieva et al., 2017), such as picnics and sports. In contrast, tall-grass meadows may provide habitat for a wide range of native plant and insect species (Filibeck, Petrella & Cornelini, 2016; Lerman, Contosta, Milam & Bang, 2018; Norton et al., 2019; Rudolph, Velbert, Schwenzfeier, Kleinebecker & Klaus, 2017), but strongly differ from short-cut lawns in their visual appearance and utility functions (Aronson et al., 2017). Because of lower management costs and the biodiversity associated with tall-grass meadows, strong incentives exist for increasing their cover in urban greenspaces (Klaus & Kiehl, 2020; Watson, Carignan−Guillemette, Turcotte, Maire & Proulx, 2019 this issue). This may be achieved with simple management interventions such as reducing the frequency of cutting and lowering the nutrient input in short-cut lawns (Chollet, Brabant, Tessier & Jung, 2018). As the community responses to such interventions may be slow and take several years, ranging from six (Sehrt, Bossdorf, Freitag

& Bucharova, 2020) to 25 years (Chollet et al., 2018), active interventions such as sowing of desired species may be utilized (Norton et al., 2019).

Before such management interventions can be implemented on a large scale, the preferences and attitudes of greenspace users regarding different types of urban grasslands must be considered. Previous research has shown urban residents in Central and Northern Europe to prefer urban park meadows with high biodiversity over those with low biodiversity (Fischer et al., 2018a) suggesting broad support for converting short-cut lawns into tall-grass meadows. Yet, a tidy, well-maintained appearance of greenspaces has also been shown to be of high importance for greenspace users (Fischer et al., 2020). In summer-dry regions, for example, near-natural urban grasslands that are not irrigated may appear dry and unattractive to local residents (Filibeck et al., 2016; Misgav, 2000).

These observations suggest that attitudes towards different types of greenspace are influenced by different social and cultural contexts (Fischer et al., 2018a). Further, the personal preference for a specific type of urban grassland management will be linked to how these grasslands are valued. To this end, we use the concepts of assigned values (*sensu* Ives & Kendal, 2014) and value pluralism (Lo, 2012; Robinson, 2011): assigned values describe the properties or features of an object of valuation (an urban grassland in this case) that render it valuable to the person perceiving it (Ives & Kendal, 2014). A distinction is made between assigned values and the more abstract underlying values (Ives & Kendal, 2014): From a greenspace management perspective, underlying values form the personal basis of how individuals perceive and value specific greenspace management scenarios and their goals (Ives & Kendal, 2014) – they are key principles a person considers important in how and why greenspaces should be managed. Meanwhile, assigned values shed light on what people value in greenspaces (Rawluk, Ford, Nerida & Williams, 2019) – they describe which features make different management scenarios desirable. Thus, both underlying and assigned values may help in understanding variation in attitudes towards a particular type of greenspace management, but especially assigned values provide a practical tool for assessing people's responses to different management alternatives (Ives & Kendal, 2014; Seymour, Curtis, Pannell, Allan & Roberts, 2010). Value pluralism, in turn, asserts that both individuals and groups may assign multiple, potentially even conflicting values to a single object of valuation (Lo, 2012; Robinson, 2011). Thus, assigned values and value pluralism provide a robust and practical framework for understanding what motivates urban residents to prefer either short-cut lawns or tall-grass meadows, and how urban residents might respond to an increase in the cover of tall-grass meadows in urban greenspace. However, assigned values explaining public attitudes towards different types of management of urban grasslands are poorly known, as are the relationships of these values to different aspects of personal greenspace use. This complicates predicting public responses to greenspace management that aims at increasing biodiversity but simultaneously alters the appearance and usability of the respective greenspace.

This study concerns the ecological and socio-cultural values assigned to urban grasslands in 19 European cities in nine different countries. A previous analysis of the same dataset has shown urban residents across Europe to prefer short-cut lawns over tall-grass meadows on one hand, but to also wish for urban greenspaces to serve as valuable habitat for native biodiversity on the other (Fischer et al., 2020). In this study, we investigate in greater depth how such preferences relate to the valuation of urban grasslands by asking the following questions:

(1) What are the assigned values with which urban residents justify their preference for either short-cut lawns or tall-grass meadows?
(2) How do different assigned values and types of greenspace use relate to attitudes towards near-natural greenspace management and a hypothetical scenario of increasing the cover of tall-grass meadows by 50% in local urban greenspaces?

Materials and methods

Data collection and study locations

The data for this study was collected as a part of a pan-European research project concerning public attitudes towards biodiversity-friendly greenspace management in cities (Fischer et al., 2020) and comprised 2027 face-to-face interviews conducted in 19 cities across nine European countries (Appendix A: **Table A.1**). The interviews assessed people's preferences for urban grasslands of two contrasting management intensities, namely short-cut lawns and tall-grass meadows, and the reasoning for preferring either of these. While the preferences for either type of grassland across different personal and cultural contexts have been reported by Fischer et al. (2020), the work at hand complements these results by providing insight into the relationship between preferring a given type of urban grassland and the personal valuation of that grassland.

The interviews consisted of a questionnaire (Appendix A: **Table A.2**), which was carefully translated into local languages, and conducted by trained local staff between 02/08/2016 and 23/12/2017. Potential respondents were selected at random as a convenience sample and approached during daylight hours in three standardized types of urban locations in each of the study cities: (a) in a park/greenspace, (b) close to a park/greenspace, (c) in an area with no park/greenspace in sight distance. The overall rejection rate was 44%.

The cities included in the study varied in their climatic conditions and population metrics: The largest city in terms of population size was Berlin in Germany (3.5 MM inhabitants) while the smallest were Palencia and Toledo in Spain and Tübingen in Germany (below 90.000 inhabitants; Appendix A: **Table A.1**). Because some characteristics of urban grasslands in cities located in climatically different regions differ to an extent, we used two slightly modified

versions of the questionnaire: In cities of boreal and temperate climates (hereafter "the temperate version"), urban grasslands are usually not irrigated, while this is frequently the case in cities with a distinct drought phase during summer, such as in the Mediterranean climate (hereafter "the summer-dry version"; Appendix A: **Table A.2**).

Questionnaire design

The questionnaire consisted of photographic stimuli, binomial two-choice questions, open-ended questions, multiple-choice questions and questions that assessed preferences on a 5-point Likert scale ('full agreement' to 'full disagreement'). In the first part of the questionnaire (Appendix A: **Table A.2** ***Question 1***), we showed respondents two picture pairs (Fig. 1), each pair contrasting a short-cut lawn and a tall-grass meadow, but being otherwise identical. The first pair differed between the temperate and the summer-dry versions of the questionnaire (Appendix A: **Table A.2** ***Question 1 A1 and A2***). In the temperate version, the first pair depicted a drawing of an urban greenspace between houses that are connected by footpaths (Fig. 1**(A) and (B)**). In the summer-dry version, the first pair depicted two children playing in either a green (irrigated) short-cut lawn or a dry tall-grass meadow with high-summer conditions (Fig. 1(C) and (D)). It should be noted that the difference in the pictures between the questionnaire versions may have primed the respondents to answer differently, thus contributing to potential differences in the results between the climatic regions.

The second picture pair was the same in both versions of the questionnaire (Appendix A: **Table A.2** ***Question 1B***), showing a tall-grass meadow element surrounded by a large short-cut lawn in one picture and only the short-cut lawn in the other, with the meadow element replaced by a short-cut lawn with a graphics program (Fig. 1**(E) and (F)**). The respondents were asked to briefly describe the reasons for their choices for each picture pair separately in an open-ended question (Appendix A: **Table A.2** ***Question 1C***).

In the second part of the questionnaire (Appendix A: **Table A.2** ***Question 2***), we presented the respondents a single picture of a path towards a lake with tall-grass meadow on the left and short-cut lawn on the right side (Fig. 1**(G)**). Here, we consciously chose a scene of late summer vegetation to specifically address the aspect of partially brownish, rather wild-looking tall vegetation. We first asked the respondents which of the two grassland types they prefer, and then to describe the impression of each of the two grassland types with two-to-three words in an open-ended question.

In the third part of the questionnaire, we asked the respondents to indicate how they used urban greenspaces with specific activities such as "Going for a walk" or "Sports" in an open choice question, resulting in categorical data ranging from 0 to

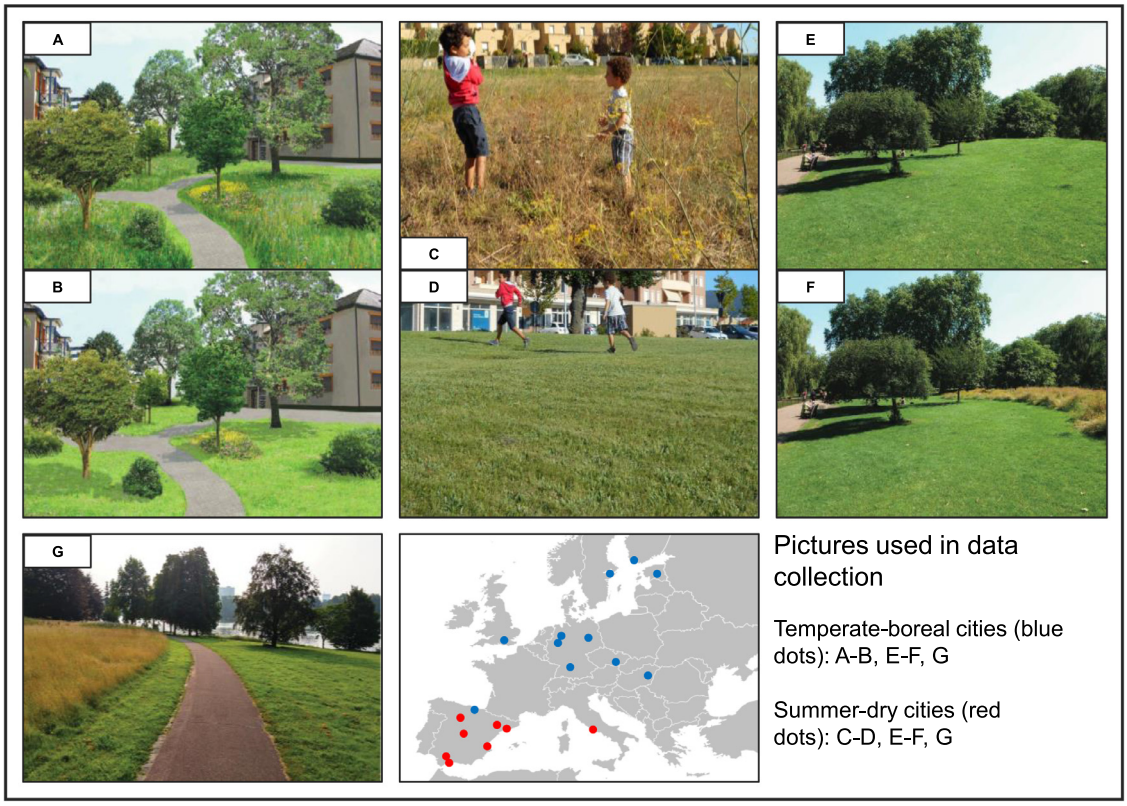

Fig. 1. Pictures used when asking for preferences of either type of urban grassland and inquiring the reasons for this choice. (A) and (B) = Question 1a, temperate version of the questionnaire, (C) and (D) = Question 1a, summer-dry version of the questionnaire, (E) and (F) = Question 1b, both versions of the questionnaire, and (G) = Question 2, both versions of the questionnaire. Copyright of pictures (A) and (B): modified after Gloor and Bontadina (2010), pictures (C) and (D): Goffredo Filibeck and pictures (E)–(G): Valentin H. Klaus.

12 different activities. The next part (Appendix A: **Table A.2** ***Question 3***) began by introducing the ecological benefits concerning the occurrence of native species and the possible trade-offs with visual appearance and usability that characterize tall-grass meadows as opposed to short-cut lawns with a standardized text. This was done to assess how people prioritize potentially conflicting greenspace functions. To capture this prioritization, we presented a hypothetical scenario where 50% of the city's lawns would be converted into tall-grass meadows (hereafter *lawn conversion)* and asked about the respondents' agreement with this procedure on a five-point Likert scale. Additional information concerning the data collection and questionnaire design can be found in Appendix A (**Table A.2)** and in Fischer et al. (2020).

Value classification

To condense the information in the open-ended answers describing the residents' reasoning for preferring either short-cut lawns or tall-grass meadows for quantitative analyses, we created a value classification robust to semantic variation in answers translated from different languages with qualitative content analysis (Elo & Kyngäs, 2007). By values we refer to assigned values (Ives & Kendal, 2014), or valued properties, that the respondents associate with different types of urban grasslands. A preliminary classification of each open-ended answer was based on value categories obtained from the literature linked with ecosystem services (Brown, 2013; de Groot, Wilson & Boumans, 2002), multifunctional landscapes (Raymond & Brown, 2007) and urban greenspaces (Tyrväinen, Mäkinen & Schipperijn, 2007). This classification was complemented with further categories based on recurring themes identified in the answers (Elo & Kyngäs, 2007). Two of the authors conducted the classification and were responsible for creating and iterating the typology of value categories. Unclear and ambiguous answers were discussed to reach a uniform interpretation of the values expressed in them.

The value classification was hierarchical, with ecological, socio-cultural and economic value groups forming the highest level within this hierarchy (de Groot et al., 2002). The next level consisted of value groups related to i) nature, ii) well-being, iii) aesthetics, iv) identity, and v) economic efficiency (Brown, 2013; Raymond & Brown, 2007). Each group consisted of 1−5 value categories, within which we identified both positive and negative **associations** of each assigned value (Table 1). For example, within the value category of *beauty* (as part of the value group *aesthetics*) we classified answers such as "better appearance" as **positive associations** and answers such as "unattractive" as **negative associations**. Two categories, *wildness (biological)* and *wildness (aesthetical)* are used to classify answers related to the naturalness or wildness of either lawn type. The former included answers that mentioned the wild or natural character of either lawn type in connection with ecological aspects, while the latter included answers, which mentioned wild or natural visual appearance in connection with aesthetic aspects. Answers that simply mentioned wildness and naturalness without context were included in both categories. For answers that treated the current appearance of the grassland as a result of deliberate management and caretaking, we created a value category of *cues to care* (Nassauer, 1995).

Statistical models

We split the data in three datasets on (1) values assigned to short-cut lawns and (2) values assigned to tall-grass meadows, and (3) information on greenspace use of the respondents. To identify the major gradients of variation in each dataset, we used principal component analysis (PCA) with package *vegan* (Oksanen et al., 2017) for the two value datasets (*value PCA*) and a categorical PCA with package *Gifi* (Mair & De Leeuw, 2019) for the categorical greenspace use dataset (*greenspace use PCA*). The data used in the value PCAs described the proportion of times a given value was associated with pictures of either tall-grass meadows or short-cut lawns, respectively. The data in the greenspace use PCA comprised a set of categorical binary variables describing whether the respondent took part in the greenspace activities presented to them in the questionnaire. The first five principal components explained 60−70% of the variation in each dataset. To assess which of the components were the most significant in expressing the variation in the datasets, we used the broken stick (*value PCA*) or Kaiser-Guttmann criteria (*greenspace use PCA*; Jackson, 1993). To determine the original assigned values and greenspace uses represented by the PCA components, we examined the loadings of the values and greenspace uses along each five first components. The principal components−regarding assigned value categories and greenspace use categories−were then used in subsequent analysis.

To determine how assigned values and personal greenspace use relate to the agreement to the lawn conversion scenario (as expressed by a five-point Likert scale), we used cumulative link mixed models (CLMM) with package *ordinal* (Christensen, 2019). Model predictors included the principal components of the three datasets as described above, with the city of data collection as random factor. Because the pictures used in data collection differed between the temperate and summer-dry version of the questionnaire, separate models were built for the two climate regions. The *p*-values in the final models were controlled against the false discovery rate (Verhoeven, Simonsen & McIntyre, 2005), a method as powerful as the Bonferroni correction but less conservative. All analyses were conducted with R version 3.6.3 (R Core Team, 2020).

Results

Values assigned to different urban grassland types

Different positive, neutral (descriptive) and negative values were used to justify the preference for either short-cut

Table 1. Categories of assigned values and their positive and negative associations used to classify answers to open-ended questions describing the justification for preferring a specific type of urban grassland, i.e. short-cut lawn or tall-grass meadow.

Level 1	Level 2	Level 3	Description: The preference is mediated or expressed through perceived...	Examples: I prefer this lawn type, because it is/has/reminds me of...
1. Ecological values	1.1 Nature	1.1.1 Wildness (biological; positive or negative)[a,b,e,f]	Appreciation for wild, diverse nature.	*"Diverse vegetation", "More real nature", "Flower meadows are good", "Better for biodiversity", "Too many flowers", "Too many animals", "Weedy".*
		1.1.2 Species richness[a,e]	Richness of species of any group.	*"It has a greater diversity of species", "A lot of plant species", "Pretty flowers, species richness".*
		1.1.3 Habitat function	Function as habitat or shelter for species.	*"More living space for animals", "Habitat for bees", "Space for bird breeding".*
		1.1.4 Intrinsic value of nature[a,b,e]	Value of nature in itself.	"*The flora is more typical from the Mediterranean*".
2. Socio-cultural values	2.1Well-being	2.1.1 Health (positive or negative)[a,b,e]	Threats or benefits to physical or mental health.	*"Danger of tick bites", "Less ticks", "No allergy, no common ragweed", "No dangers for kids", "More risk of fire".*
		2.1.2 Utility: Recreation (positive or negative)[a,b,e,f]	Possibilities for recreation separate from nature.	*"I could lay there" "Better suited to sunbathing", "Children can play better".*
		2.1.3 Utility: Inspiration	Possibilities for inspiration.	*"It is not inspiring", "Looks interesting", "Exciting", "Boring".*
		2.1.4 Utility: Nature experiences	Possibilities for recreation related to nature.	*"Spot for picking flowers".*
		2.1.5 Utility: Social interactions	Possibilities for recreation related to other people.	*"More space for people to spend time in", "Available picnic space".*
	2.2 Aesthetics	2.2.1 Wildness (aesthetic; positive or negative)[a,b,e,f]	Aesthetic appreciation for nature.	*"More natural, does not look so planted", "More colorful, more natural", "No ugly grass in the back", "Tall grass is scrubby", "Weedy".*
		2.2.2 Beauty (positive or negative)[c,d]	Aesthetic appreciation separates from nature.	*"More beautiful", "More attractive", "Pretty", "Not pretty".*
		2.2.3 Cleanliness, order (positive or negative)[c,d]	Conception of order and tidiness in the landscape.	*"Tidy", "Neat", "Too neat", "Orderly", "Well-kept", "Neater without the tall grass", "Too strict", "Unkempt".*
		2.2.4 Cues to care (positive or negative)[c,d]	Signs of deliberate management and care-taking that result in the present appearance of the lawn.	*"More care", "Cared", "Appears cared for, "It is not neglected", "It is managed", "Unkempt", "More groomed".*
		2.2.5. Origins	Origin of either human action or natural processes	*"More adapted to humans", "Human influence", "Man-made ecosystem", "Human-created grassland", "Un-mown", "Mown".*
	2.3 Identity	2.3.1 Sense of identity[a,b]	Importance to personal history or worldview	*"Reminds of childhood days", "Reminds me of old times", "My village, my childhood".*
		2.3.2 Urban norms (positive or negative)	Normative expectations of what an urban landscape should look like, often contrasted with rural landscapes	*"More suitable for the city", "In residential areas tidy greenspaces are better", "The short grass is better in the city", "Living areas should be maintained",*
3. Economic values	3.1 Economic	3.1.1 Cost/effort[a,b,e]	Monetary costs or required effort.	*"Looks like people made an effort".*

Note: Value categories 1.1.1 and 2.2.1 overlap due to certain answers being included in both categories.
References: This specific value or some of similar type has previously been assessed in:
[a] Brown and Reed (2000).
[b] Brown (2013).
[c] Nassauer (1995).
[d] Nassauer et al. (2009).
[e] Raymond and Brown (2007).
[f] Tyrväinen et al. (2007).

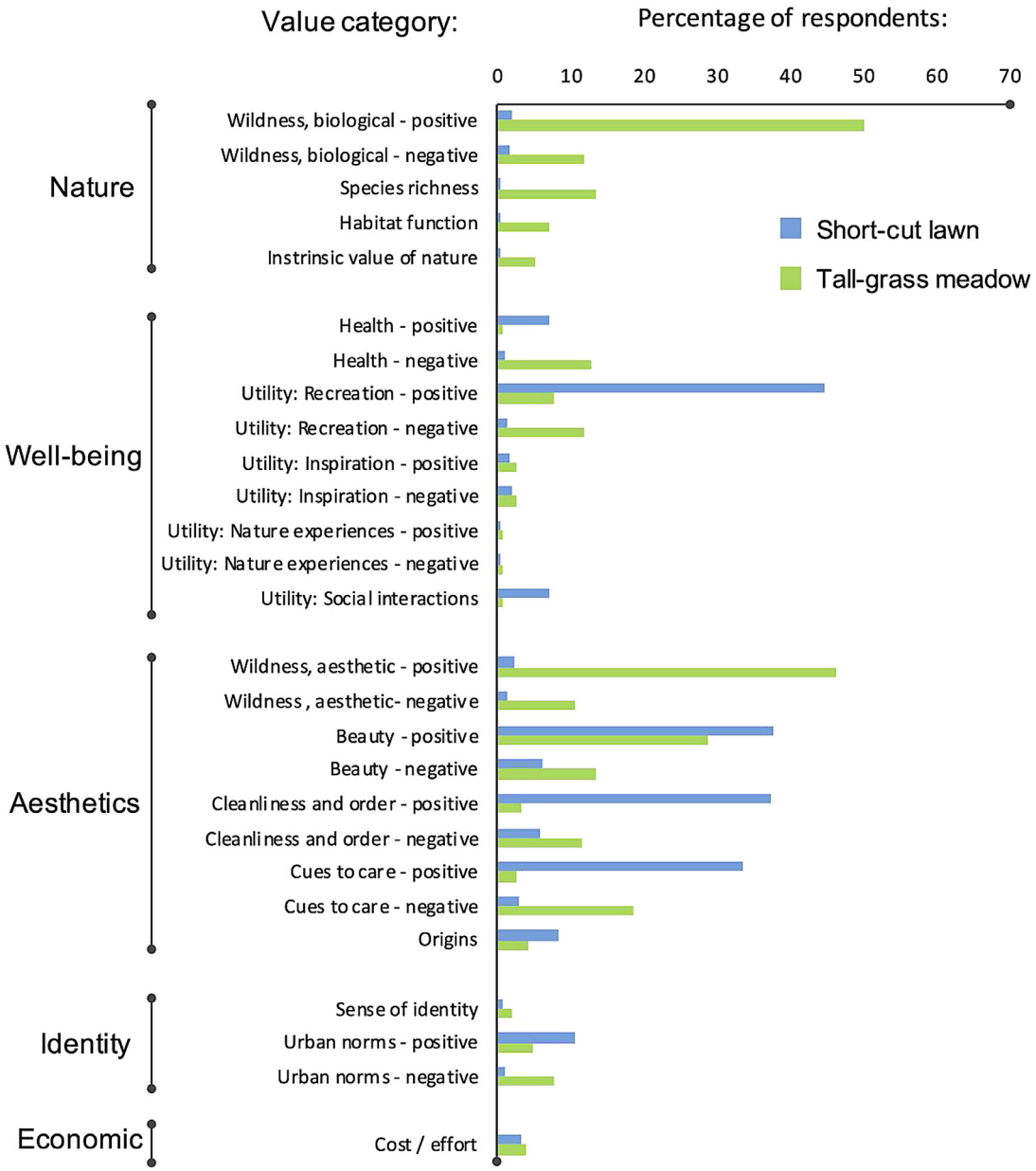

Fig. 2. Percentage of respondents justifying the preference of short-cut lawns or tall-grass meadows with positive, negative or neutral associations from 27 value categories forming five value groups ($N = 2027$).

lawns or tall-grass meadows, with the responses mostly concerning the preferred grassland type and rarely the type which the respondents did not prefer. Preference for tall-grass meadows was most frequently attributed to positive ecological values, while preference for short-cut lawns was most attributed to positive socio-cultural values (Fig. 2). The most common values assigned to tall-grass meadows were positive associations of biological or aesthetic wildness ("*Wild flowers*", "*More natural*") and beauty ("*More pleasing to the eye*"), followed by negative associations of cues to care ("*Not well managed*"), beauty ("*Ugly*") and the neutral association of species-richness ("*[It has] butterflies, ladybirds, bees, animals*"). The most common values assigned to short-cut lawns were, in turn, positive associations of recreation utility ("*Lots of activities can be done*"), cleanliness and order, ("*Tidier*", "*Neater*"), cues to care ("*It looks well kept*") and beauty ("*Beautiful green*") (Fig. 2).

The positive and negative associations of certain values particularly differed between the two grassland types. For example, tall-grass meadows were more often mentioned as to not suit or belong in urban areas ("*Residential area, [the lawn] must be neat*", "*It is not appropriate for the city*"; 7.6% of respondents) than short-cut lawns. Cues to care, in turn, was associated positively with short-cut lawns (33.4% of respondents) and negatively (i.e. the lack of care) with tall-grass meadows (18.4% of respondents). Some values

were assigned as a negative and a positive association for the same grassland type. Value categories with differences between positive and negative associations within grassland types included biological or aesthetic wildness, recreation potential, cleanliness, cues to care and urban norms. For example, the cleanliness of short-cut lawns was mentioned as a positive (37.2% respondents) and as a negative (5.6%) feature, and the wildness of tall-grass meadows both as a positive (50.05% of respondents) and as a negative (11.8%) association.

The most common greenspace uses were going for a walk (1014 respondents, 50%), recreation and relaxation (772, 38.1%), meeting people for social contacts (592, 29.2%), doing sports (541, 26.7%), passing through (538, 26.5%), and experiencing and watching nature (538 respondents, 26.5%).

Main gradients in assigned values

The first five principal components (PCs) explained 69% of the total variance in values assigned to tall-grass meadows and 79% in values assigned to short-cut lawns, respectively (Table 2). For tall-grass meadows, PC1 explained 41% of the total variance and described the positive association of tall-grass meadows with wildness. The remaining axes were associated with beauty (PC2), wildness (negative, PC3), species richness (PC4), and cues to care (negative, PC5; Table 2). For short-cut lawns, PC1 described a strong positive association of short-cut lawns with cleanliness, explaining 24% of the total variance. The other components were associated with cues to care (PC2), beauty (PC3), recreation potential (PC4) and urban norms (PC5; Table 2). The eigenvalues of the components were in general rather small, but according to the broken stick-criterion (Jackson, 1993), especially PC1 of the tall-grass meadow valuation PCA and PC's 1−4 of the short-cut lawn valuation PCA surpass the others in importance.

As for the greenspace use data, the first five PCs explained 60% of the total variance in reported ways of greenspace use. PC1, explaining 23% of variance, was most correlated with social and nature-related activities, such as meeting people and observing nature (Table 2). We termed this component *'Social nature lovers'*. PC2, termed *'Family recreation'*, explained 11% of the variation and was most correlated with taking the children outside, passing through greenspaces (negative) and going for a picnic. PC3, termed *'Sunbathers'*, explained 10% of the variation and was strongly correlated with recreation and sunbathing, while PC4, termed *'Passers-by'*, explained 8% of variation and was correlated with passing through greenspaces and with going for a walk. Finally, PC5 explained 8% of the variation and was most correlated with taking children outside and thus termed *'Parents'*, though it is clear that not all of the persons included were actually parents. According to the Kaiser-Guttman criterion (Jackson, 1993), PC's 1−4 were more important than the rest.

Attitude towards converting lawns into meadows

According to the CLMMs, predictors for a positive attitude towards converting 50% of local lawns into tall-grass meadows in boreal and temperate cities were positive associations of wildness and the neutral associations of species richness with tall-grass meadows, as well as the use of greenspaces for social and nature-related activities (Table 3a). Negative predictors were positive associations of recreation potential and cleanliness with short-cut lawns. The results were similar in the summer-dry cities (Table 3b), but the negative association of wildness with tall-grass meadows and the use of greenspaces for passing through them were significant negative predictors for the attitude towards lawn conversion.

Discussion

Urban tall-grass meadows can support considerably higher levels of native biodiversity than short-cut lawns (Norton et al., 2019; Rudolph et al., 2017; Watson et al., 2019). This study shows that the degree to which urban residents across Europe agree with converting short-cut lawns into biodiversity-friendly tall-grass meadows largely depends on the ecological and socio-cultural values that the residents assign to different types of urban grasslands, as well as the ways in which they use greenspaces.

Different values influence attitudes towards management

We found that multiple and, in some cases, clearly conflicting values are linked with residents' attitudes towards two types of urban grasslands. For instance, while residents agreeing with lawn conversion tended to prefer tall-grass meadows due to positive associations of wildness, negative associations of wildness were also assigned to the same type of grassland by other residents, indicating that the perceived wildness of urban greenspaces is highly controversial. In line with this, positive associations of cleanliness and recreation potential with short-cut lawns were linked with opposition towards converting short-cut lawns to tall-grass meadows. These findings suggest that in addition to perceived wildness, cleanliness and cared appearance influence people's attitudes towards near-natural greenspaces (Fischer et al., 2020; Hoyle, Jorgensen, Warren, Dunnett & Evans, 2017; Nassauer, 1995; Nassauer et al. 2009).

Our results corroborate previous findings of diverse attitudes towards near-natural urban greenspaces (Qiu, Lindberg & Nielsen, 2013), linked largely to cultural norms (Nassauer et al. 2009, Fischer et al., 2020). Following a widespread cultural norm, a clean and cared appearance of a landscape is desirable, and ultimately a sign of sociable human intention (Cook, Hall & Larson, 2011; Nassauer, 1995; Nassauer et al., 2009). In accordance with our findings, earlier studies have

Table 2. Five first principal components from ordination analyses based on (**a**) values associated with tall-grass meadows, (**b**) values associated with short-cut lawns and (**c**) different ways of greenspace use across Europe. Asterisks denote components considered significant according to the broken stick − (a) and (b) or Kaiser-Guttmann − criterion (Jackson, 1993) (c).

Component	Eigen-value	Proportion of explained variance (cumulative prop. in parentheses)	Original variable with largest loading (in parentheses)	Preferred lawn type and justification (a) and (b), mode of greenspace use (c):
(a) Tall-grass meadows				
PC 1*	0.18	0.41 (0.41)	Wildness as positive association (0.72)	*"I prefer tall-grass meadows because of their wild and natural appearance."*
PC 2	0.04	0.10 (0.51)	Beauty as positive association (0.97)	*"I prefer tall-grass meadows because of their beauty."*
PC 3	0.03	0.07 (0.58	Wildness as negative association (0.67)	*"I do not prefer tall-grass meadows because they are too wild and natural."*
PC 4	0.02	0.06 (0.64)	Species richness (0.73)	*"I prefer tall-grass meadows because of their species richness."*
PC 5	0.02	0.05 (0.69)	Cues to care as negative association (0.82)	*"I do not prefer tall-grass meadows because of their lack of care."*
(b) Short-cut lawns				
PC 1*	0.08	0.24 (0.24)	Cleanliness as positive association (0.72)	*"I prefer regular lawns because of their clean appearance."*
PC 2*	0.06	0.18 (0.42)	Cues to care as positive association (0.80)	*"I prefer regular lawns because of their cared appearance."*
PC 3*	0.05	0.16 (0.58)	Beauty as positive association (0.89)	*"I prefer regular lawns because of their beauty."*
PC 4*	0.05	0.16 (0.74)	Recreation potential as positive association (0.92)	*"I prefer regular lawns because of their recreation potential."*
PC 5	0.01	0.05 (0.79)	Urban norms as positive association (0.98)	*"I prefer regular lawns because they fit well to urban areas."*
(c) Greenspace uses				
PC 1*	2.60	0.23 (0.23)	Recreation (0.66), nature experiences (0.65), meeting people (0.59).	*'Social nature lovers'*
PC 2*	1.17	0.11 (0.34)	Taking the children outside (0.64), passing through (−0.52), picnics (0.41).	*'Family recreation'*
PC 3*	1.06	0.10 (0.44)	Recreation (0.42), sunbathing (0.40).	*'Sunbathers'*
PC 4*	1.03	0.08 (0.52)	Passing through (0.55), going for a walk (0.48).	*'Passers-by'*
PC 5	0.89	0.08 (0.60)	Taking the children outside (0.58).	*'Parents'*

reported that urban residents may associate messiness negatively with meadow-like urban greenspaces (Filibeck et al., 2016) and appreciate the well-maintained appearance of managed lawns (Ignatieva et al., 2017). A well-maintained appearance, however, could be achieved in tall-grass meadows as well without compromising the benefits they convey to biodiversity. For example, signs of caretaking such as mown borders and mown paths transecting a meadow could increase the acceptance of this type of urban grassland (Zobec, Betz & Unterweger, 2020). Norms on what is acceptable for greenspace appearance may also depend on the spatial context, such as surrounding greenspaces, and the location of the greenspace in question: neighborhoods where the predominant yard design incorporates ecologically valuable features, the design of more conventional yards with short-cut lawns has been shown to be preferred less by residents (Nassauer et al., 2009). According to Hoyle et al. (2017), greenspace managers declared the location of a given tall-grass meadow to strongly influence whether such greenspaces are viewed positively amongst local inhabitants, with semi-rural locations being preferred as opposed to formal park settings. Thus, on the one hand, tall-grass meadows might face less disapproval in urban areas where they are not only a curiosity amongst regular lawns, but rather form an established part of the greenspaces of that area, and on the other in a spatial setting considered appropriate for them.

Similarly, perceptions of wildness or naturalness, and whether they are seen positively or negatively, depends on the cultural and personal context of the respondent (Hoyle, Jorgensen & Hitchmough, 2019; Kirchhoff & Vicenzotti 2014; Larson, Cook, Strawhacker & Hall, 2010; Nassauer, 1995). However, our results point to a similar positive relationship between perceived wildness of tall-grass meadows and the acceptance of lawn conversion across the continent: in both temperate and summer-dry cities, urban residents who value the wildness of tall-grass meadows positively are positive towards transforming short-cut lawns into tall-grass meadows. In summer-dry cities a negative association of wildness with tall-grass meadows caused also a negative attitude towards lawn conversion. In addition, valuing the species richness of tall-grass meadows is positively correlated with agreeing to lawn conversion in both temperate and summer-dry regions. Two likely explanations for these results exist: wildness and species richness may be valued as positive intrinsic properties of tall-grass meadows, and/or they may be instrumental for other values assigned to tall-grass meadows such as aesthetic experiences or well-being. For example, greenspaces rich in plant species and flowers are often perceived as attractive (Fischer et al., 2018a; Lindemann-Matthies, Junge & Matthies, 2010; Southon, Jorgensen, Dunnett, Hoyle & Evans, 2017) and may increase psychological well-being by aiding in stress recovery (Fuller, Irvine, Devine-Wright, Warren & Gaston, 2007) or by triggering factors that moderate well-being such as nature connectedness (Southon, Jorgensen, Dunnett, Hoyle & Evans, 2018).

Greenspace uses and recreational potential

Data on personal greenspace use provided further insights into how residents' assigned values manifest in preferences for near-natural urban grassland management. We found that residents who utilized greenspaces for social and nature-related activities and recreation, such as nature experiences and meeting people (the component '*Social nature lovers*'), tended to agree with lawn conversion to tall-grass meadows. This is in line with findings on recreational park activities, showing a strong positive relationship between social and nature-related uses and people favoring high species richness in park meadows (Fischer et al., 2018b). Fischer et al. (2020), using the same dataset as in this study, also report a positive relationship between the number of different activities performed in greenspaces and positive attitudes to near-natural greenspace management. These results further fit to the assumption that recreational use of meadow-like informal greenspaces correlates with their positive valuation (Brun, Di Pietro & Bonthoux, 2018). Such observations may be strongly linked to other perceived possibilities for recreation, such as relaxation (Unterweger, Schrode & Betz, 2017) or urban foraging (Fischer & Kowarik 2020; Palliwoda, Kowarik & von der Lippe, 2017). In contrast, in the data gathered from nine boreal and temperate cities, we found that valuing short-cut lawns positively for their recreation potential translated to a negative attitude towards converting lawns into meadows. This result may highlight a fear that increasing the proportion of tall-grass meadows would restrict the recreational utility of urban greenspaces. For instance, while tall grass hardly impedes walking along paths or enjoying the scenery, it may well prevent playing soccer. Clearly, more research is needed on the compatibility of tall-grass meadows and specific recreation activities, and on how the recreation potential could be reconciled between the two types of urban grassland. This is especially the case as the pictures used in data collection in this study contained slightly differing cues concerning the recreation potential of different types of urban grasslands between the two climatic regions (i.e. children were shown playing only in Fig. 1(B) and (C) presented to the respondents in the summer-dry regions).

We also found indications that residents who use greenspace for mainly passing through in the summer-dry regions (the component '*Passers-by*') were rather against increasing the cover of tall-grass meadows in urban greenspaces. This result may point to unexploited opportunities in linking people with urban nature, as passing through more diverse grasslands could in theory help increase everyday experiences with biodiversity and counteract the bemoaned extinction of experience (Soga & Gaston 2016). However, more research is needed on the exact reasons why simply passing through greenspaces is linked to a rather negative view on tall-grass meadows, and how this can be accounted for by greenspace design and management.

Conclusions and implications

Extensively managed, wild urban greenspaces and experiences of wildness and naturalness in urban areas are increasingly recognized as goals of greenspace management (Kowarik, 2018, Klaus & Kiehl, 2020). While high biodiversity in urban greenspaces can count on the support by large parts of society (Fischer et al., 2018a, 2020), the management practices involved also need to account for a very broad acceptance by the public. In other words, considering the values people assign to urban nature is important when planning for biodiversity conservation in public greenspaces (Cook et al., 2011; Ives & Kendal 2014; Ives et al., 2017; Larson et al., 2010).

Our results, broadly similar across both temperate and summer-dry regions of Europe, indicate that introducing tall-grass meadows into urban greenspaces may face positive, but also mixed approval due to the different values associated with different types of urban grasslands. Specific cues to care, such as mown borders and pathways in tall-grass meadows, and signposts informing residents of biodiversity-friendly grassland management could convey a positive message of deliberation, rather than neglect, of the

Table 3. Full cumulative link mixed models fitted with Laplace approximation predicting people's attitude towards transforming 50% of short-cut lawns into tall-grass meadows with assigned values and ways of greenspace use in **a)** eleven boreal and temperate (N = 1035) and **b)** eight summer-dry cities (N = 985). Statistically significant predictors appear in bold ($p < 0.05$). **M** = Tall-grass meadow. **L** = Short-cut lawn.

(a) Temperate and boreal cities Fixed effects	Estimate	SE	z-value	Adj. *p*-value
Value-association with M: Wildness - positive	**4.13**	**0.63**	**6.54**	**< 0.001**
Value-association with M: Beauty - positive	**1.35**	**0.51**	**2.68**	**0.018**
Value-association with M: Wildness - negative	-0.97	0.52	-1.85	0.106
Value-association with M: Species richness - neutral	**3.75**	**0.63**	**5.98**	**< 0.001**
Value-association with M: Cues to care - negative	0.69	0.73	0.94	0.436
Value-association with L: Cleanliness - positive	**-2.51**	**0.67**	**-3.72**	**< 0.001**
Value-association with L: Cues to care - positive	1.22	0.74	1.64	0.150
Value-association with L: Beauty - positive	-0.23	0.61	-0.38	0.700
Value-association with L: Recreation potential - positive	**-2.62**	**0.69**	**-3.77**	**< 0.001**
Value-association with L: Urban norms - positive	-0.59	0.51	-1.15	0.339
Greenspace use: *'Social nature lovers'*	**0.36**	**0.08**	**4.58**	**< 0.001**
Greenspace use: *'Family recreation'*	-0.13	0.06	-2.16	0.057
Greenspace use: *'Sunbathers'*	0.04	0.06	0.63	0.565
Greenspace use: *'Passers-by'*	0.16	0.07	2.41	0.342
Greenspace use: *'Parents'*	-0.05	0.07	-0.80	0.488
Random effects	**Variance**	**SD**		
City	0.31	0.56		
AIC: 2344.695; **Condition number of Hessian:** 326.47				

(b) Summer-dry cities Fixed effects	Estimate	SE	z-value	Adj. *p*-value
Value-association with M: Wildness - positive	**5.67**	**0.80**	**7.12**	**< 0.001**
Value-association with M: Beauty - positive	0.29	0.72	0.40	0.888
Value-association with M: Wildness - negative	**-1.60**	**0.58**	**-2.75**	**0.022**
Value-association with M: Species richness - neutral	**1.77**	**0.65**	**2.74**	**0.022**
Value-association with M: Cues to care - negative	1.00	0.50	1.99	0.086
Value-association with L: Cleanliness - positive	-1.32	0.63	-2.09	0.083
Value-association with L: Cues to care - positive	-0.08	0.48	-0.17	0.908
Value-association with L: Beauty - positive	-0.32	0.52	-0.62	0.888
Value-association with L: Recreation potential - positive	-1.25	0.60	-2.07	0.083
Value-association with L: Urban norms - positive	-0.31	0.62	-0.50	0.888
Greenspace use: *'Social nature lovers'*	**0.29**	**0.08**	**3.70**	**0.002**
Greenspace use: *'Family recreation'*	-0.01	0.07	-0.12	0.908
Greenspace use: *'Sunbathers'*	0.02	0.07	0.36	0.888
Greenspace use: *'Passers-by'*	**-0.20**	**0.07**	**-2.68**	**0.022**
Greenspace use: *'Parents'*	0.02	0.07	0.29	0.888
Random effects	**Variance**	**SD**		
City	0.62	0.79		
AIC: 2417.637; **Condition number of Hessian:** 391.70				

current state of the tall-grass meadows, making them more acceptable amongst urban residents (Nassauer 1995, Hoyle et al., 2017; Southon et al., 2017; Unterweger et al., 2017; Zobec et al., 2020). Personal familiarity with the potential role of less managed greenspaces in biodiversity conservation has been shown to increase their acceptability (Qiu et al., 2013) and might also increase the respective aesthetic experience (Gobster, Nassauer, Daniel & Fry, 2007). Finally, to pursue long-lasting results meeting both the aims of biodiversity conservation and the needs and desires of urban residents, tall-grass meadows could be designed to accommodate also the range of values attached to short-cut lawns.

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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Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.baae.2020.10.006.

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