
Wildflowers in urban design: an exploratory research of preference in Italian adults.

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Abstract

Wildflowers are plants rich in diversity that can be used in many different ways. Nevertheless they are not widely used in Italian urban settings. This exploratory study aims to investigate preference for wildflowers. To this end, seventy-six adults answered a questionnaire developed to assess a series of wildflower pictures for preference (pictures depicted wildflowers in natural and urban environments, showing pro and cons of this cultivation), and a series of questions concerning wildflowers and their use (questions served as a control of preference ratings). To investigate a secondary area - how preference for wildflowers may be affected by the way the issue is presented - the questionnaire was presented with or without the title explaining the nature of the study, and each question presented with or without a picture. Finally, we considered whether an individual's connection to Nature affects preference for wildflowers. Results showed our participants liked wildflowers (no differences between genders and ages emerged) and this correlated with participants' connection to Nature. However, questions concerning the actual use of wildflowers in urban settings still remain, e.g. concerning the fauna that comes with them, and people being more used to ornamental vegetation that challenges preference and use of wildflowers.

Keywords: Connection to Nature, Preference, Public Perception, Urban Settings, Wildflowers.

1. Introduction

The use of wildflowers in parks and gardens has been well known for centuries all over Europe but the concept of 'wild gardening' or 'flowery med' or 'meadow gardening', i.e. of assembling plants and flowers that grow wild in a specific region, has emerged only in the last few decades (Woudstra & Hitchmough, 2000). Nevertheless it has been gaining more and more popularity in planning theory, policy and landscape design of such communities as sustainable vegetation (Hitchmough, 2004; Ponte-e-Sousa et al., 2016). What are wildflowers? A good explanation is: 'flowering herbaceous perennials and annuals, best suited to be sown in a mixture for the creation of wild meadows managed in a sustainable way' (ISPRA, 2010). Indeed, the main advantages of wildflowers are ecological, economic and aesthetic in the management scenario and can be used for different purposes, e.g. from recovering and renaturalizing derelict urban or anthropized soils to ornamental purposes (Bretzel, 2009). In economic terms, the benefits can be seen in the reduction in mowing regimes compared to turf grasses, or in water regimes unlike flowerbeds which need watering on a regular base during summer periods, which can be quite costly. From an aesthetic benefits point of view, wildflowers are often seen as having increased colour, more interesting texture and exceptional seasonal change. Meadows also have a more diverse plant community compare to other habitat types and can provide shelter for a great number of wildlife and insects (Ahern et al., 1992). This biodiversity is seen as a very valuable aspect of a natural environment (Lindemann-Matthies et al., 2010; Voigt & Wurster, 2015), but, most importantly, it is able to increment the aesthetic interest of urban green spaces (Lindemann-Matthies & Brieger, 2016).

In addition to being sustainable, wildflower meadows in anthropogenic areas represent a link between urban environments and rural areas (Bretzel et al., 2016). Literature shows that people greatly appreciate rich and more diverse plant communities, which add attractiveness and biodiversity to urban green spaces (Folmer et al., 2016). Urban green spaces that contain high number of flower species, typical of wildflowers, are the keys for provision of ecosystem services (Fuller, 2007; Mitchell, 2008), which in turn, are known to have positive impacts on human health and quality of life (Baur et al., 2013; Kabish et al., 2014). Accessible Nature has been proven to reduce stress, promote mental restoration and emotional self-regulation from just visiting it (Kaplan & Kaplan, 1989; Ulrich et al., 1991; Hartig, 2003; Berto, 2014; Collado et al., 2016; Cox et al., 2017). Moreover, the presence of wildflower meadows in city environments would allow residents to observe and enjoy Nature in the first place (Bretzel et al., 2016), thereby fostering and enhancing the individual sense of connection to Nature, i.e. the extent to which people feel to be a part of the natural world, feel a sense of oneness with Nature, of kinship with animals and plants and of equality between self and Nature (Mayer & McPherson Frantz, 2004). Research demonstrates that the more time people spend in Nature, the more they feel a sense of connection to it (Schultz, 2000). Not only people who feel very much connected to Nature experience a higher sense of well-being, but connectedness to Nature is also an important predictor of ecological behaviour (Berto & Barbiero, 2017), and has also an important role in predicting intentions to engage with the natural environment. Generally speaking, people who have a greater experience of the natural environment express greater affective connections with it than those with less experience. In this perspective, to stimulate one's affective sense of connection to Nature through exposure to wildflower beds and urban green in general could be seen an important step because it would simultaneously affect Nature perceived restorativeness (Berto et al., 2018) and environmental concern (Berto & Barbiero, 2017). In fact, people are not all aware of the psycho-physiological benefits deriving from exposure to natural elements and this 'lack', due to a weak sense of connection to Nature, affects the perception of Nature restorative power and preference for natural environments. In this regard (Berto et al., 2018) recently identified people's connection to Nature as an antecedent of positive perceptual experiences of natural settings that was able to predict preference and people's ability to perceive how Nature (in its different aspects) can be restorative. In order to stimulate and/or enhance connection to Nature, people need to be exposed more and more frequently to Nature. Flower beds serve perfectly the aim to connect people to Nature (Younis et al., 2010; Shoemaker et al., 1991). Indeed, Nature relatedness predicts environmental sustainable attitudes and behaviours and happiness. Happiness affects subjective well-being and both can easily be increased by spending more time enjoying Nature. This in turn, contributes to act environmentally

sustainable behaviours (Zelenski & Nisbet, 2014). In this regard, Shwartz (2014) found that people express high interest in flower diversity. If people are more aware of biodiversity and species diversity, typical of wildflowers, they would be more likely to accept and support in conservation acts and take on pro-environmental behaviours (Cilliers, 2010; Barbaro & Pickett, 2016).

Naturalistic planting and different habitats could better stimulate individuals' interest in the natural world and could provide better educational activities (Özgüner et al., 2007) because of their ecological, economic and aesthetic values. When horticultural and conservation activities are organized to teach in depth about wildflowers, i.e. seed dormancy, propagation methods and plant identification, they become greatly appreciated by the local community (Younis et al., 2010). Since many studies suggest and demonstrate that Nature can have impacts on the well-being of people, and that educational activities could help them reconnect to the natural world (Shwartz et al., 2014), the need to involve residents in planning decisions and giving them a role in planning their own public spaces, becomes more and more important (Faehnle et al., 2011). Social values and attitudes towards green areas are key factors to integrate citizens in the planning process (see co-design, Gobster et al. 2000; Tyrväinen et al. 2007, Santz et al., 2015) and the public can provide excellent input for improving urban environments (Weber et al., 2014).

This research study is part of a broader project aimed to investigate whether people really like wildflowers for urban uses and if the eventual realization of wildflower meadows is suitable for urban environments. To our knowledge, this exploratory study is the first of its kind, therefore an ad-hoc questionnaire was developed to consider preference for wildflowers. The main aim of the study was to find out whether a group of adults liked wildflowers in general and for different urban uses, and then if differences between genders and ages existed. To this end, the questionnaire was made up of different sections. In a section of the questionnaire participants will be requested to assess a series of pictures for preference, and in another one they will be asked a series of questions concerning wildflowers and their use. Pictures will depict wildflowers in natural and urban environments, showing pro and cons of this cultivation, while questions will serve as a control of preference ratings. In fact, a secondary hypothesis of this study concerns how people's preference for wildflowers may be affected by the way the issue is presented. To this aim the same questionnaire will be presented with or without the title explaining the Nature of the study, and each question of the questionnaire presented with or without a picture. Finally, in order to discover whether an individual inclination towards Nature may affect preference for this natural element, subjects' connection to Nature will be assessed as well.

2. Method

2.1 Participants

Seventy-six volunteers (33 males and 43 females) from 21 to 75 years of age ($M = 35.68$, $SD = 14.87$) were randomly chosen from the metropolitan area of Torino, Italy. The participants were chosen using a convenience sampling procedure and were recruited in streets, residential and urban areas. Participants were asked if they wanted to participate in an anonymous environmental psychology survey of the duration of approximately 10/15 minutes.

2.2 Instruments

To accomplish the study's aim two instruments were administered, an ad-hoc devised questionnaire and the Connectedness to Nature Scale.

The questionnaire

A questionnaire was designed to assess the preference for wildflowers composed of 27 items and made up of three parts. In the first part respondents were requested to provide socio-demographic information (gender, age, level of education, occupation and, if a student, course of study). The second part aimed to evaluate the level of preference of 12 pictures chosen to show urban landscapes with and without wildflowers. These pictures were selected from a large number of pictures, where wildflowers were differently represented, systematically collected from magazines and existing stimulus materials. The goal was to provide as wide as a variety of pictures as possible showing settings

with and without wildflowers, showing wildflowers in different moments of their blooming, how they appear in winter, their different uses in urban areas (e.g. to hide tram tracks, as traffic islands, in flower beds, etc.) and the fauna related to this type of flower. The pictures assessed by four independent judges were finally sorted into 6 environmental categories: Wild Natural (WN: wildflowers in natural environment), Wild Urban (WU: wildflowers in urban environment), Safety Natural (SN: presence of insects, small reptiles, mammals around wildflowers in natural environment), Safety Urban (SU: presence of insects, small reptiles, mammals around wildflowers in urban environment), Wild Urban Winter (WUW: wildflower bed in winter when flowers are not present and the bed looks dry) and Pre-Post (PP: wildflowers in summer and in winter, i.e. flower beds shown with and without flowers). Each category was represented by two examples in order to diminish the likelihood of the so-called 'place effect' in which the respondents' answer is bound to that particular image, e.g. presence of a disturbing element to the subjects, pictures perspective, etc. With two pictures per category it is possible to evaluate the environmental category average answer (see Purcell et al., 2001). In the third part of the questionnaire participants were asked to assess 15 items without images used as control or 'liar detector' for the first part, i.e. for the answers to the pictures.

All items were rated on a Likert scale from 1 to 5 where: 1= not at all, 2 = very little, 3 = rather much, 4 = much, 5 = completely. Only two items required the binary response 'Yes-No'.

Figure 1 shows three examples of pictures (a, b, c) to be assessed for preference and the equivalent control items, without pictures.



Figure 1. From left to right: (a) a pathway created amongst wildflowers; (b) two bees sucking nectar from a wildflower; (c) wildflowers in an urban environment during winter months. Participants were asked this question for each picture: 'How much do you like this picture?'

Control items. For picture 1a: 'Do you get concerned from the presence of insects (e.g. grasshoppers), small mammals (e.g. hares, mice) or reptile (e.g. lizards) in an urban park?' For picture 1b: 'Are you comfortable when walking in a park notice bees and other insects?' For picture 1c: 'Do you like seeing wildflowers in the city?'

In order to eliminate the so-called 'sequence or order effects' three different versions of the questionnaire were created, where the order of the 27 items was randomised (McBurney & White, 2008). Moreover, to evaluate if preference for wildflowers can be influenced by the way the issue is presented, the so-called *framing effect* (Tversky & Kahneman, 1981; Tversky et al., 1988), half of the participants were administered the questionnaire with the presence of the following title in the heading: 'Questionnaire on the aesthetic and visual quality of the landscape'. The version of the questionnaire with the title will be called 'title', whereas the version without 'no title'.

The connectedness to Nature Scale

The Connectedness to Nature Scale (CNS; Mayer & McPherson Frantz, 2004) evaluates the individual's bond with Nature. The CNS is made up of 14 items which evaluate how much an individual feels to be part of the natural world ($\alpha = .84$; Mayer & McPherson Frantz, 2004). Each item is assessed on a Likert scale from 1 to 5 where 1 is equivalent to 'never' and 5 to 'always'.

2.3 Procedure

In order to minimise external distractions, the individual administration of the questionnaire took place in a peaceful and quiet environment at the Department of Agricultural and Environmental Sciences of the University of Torino. Each participant was given one of the three versions of the

questionnaire and asked to carefully read the instructions. It was emphasized they should carefully think before answering and, if some questions were hard to understand, it was possible to ask for further clarification. Once they had completed the questionnaire, the participants were asked to fill out the CNS. The same procedure was used for each participant. Participants' data consent was obtained, and confidentiality guaranteed.

3. Results

Two of the 27 items of the questionnaire required the binary response Yes-No. The first 'binary' item assessed how participants liked wildflowers and the second if they were members of any association concerned with environmental issues (e.g. Greenpeace, WWF, Legambiente, etc.). Since almost the totality of the sample responded positively to the preference for wildflowers (96%), and only 4% of the participants were involved in associations that fight to protect the environment, it was decided to not include these two items in the future analysis. Our sample was homogeneous as far as the preference for wildflowers was concerned.

A reliability analysis performed on the remaining 25 items showed the devised questionnaire was reliable: $\alpha = .75$.

The 12 pictures were grouped in 6 different environmental categories: WU (wild-urban), WN (wild-natural), SN (safety-natural), SU (safety-urban), WUW (wild-urban-winter) and PP (pre-post), where preference for each category was assessed by two pictures. The highest preference score belongs to WN, with an average score of 4.22 out of 5, whereas the lowest average score was given by the participants to the environmental category WUW, with a value of 2.26 (see **Table 1**).

| | WU | WN | SU | SN | WUW | PP |
|-------------------------|-------|-------|-------|-------|-------|-------|
| Preference score | 3.40 | 4.22 | 3.76 | 2.80 | 2.26 | 3.83 |
| | (.65) | (.63) | (.72) | (.55) | (.71) | (.75) |

Table 1: Mean preference score and SD in parenthesis for the 6 environmental categories. WU = Wild Urban, WN = Wild Natural, SN = Safety Natural, SU = Safety Urban, WUW = Wild Urban Winter and PP = Pre Post.

A univariate ANOVA was performed to evaluate if there was an effect of the category (fixed factor) on the subjects' preference score. A significant effect of the category emerged, $F(5, 375) = 101.36$, $p < .001$, showing that variations in subjects' preference were due to the category to which the picture belongs to.

The next step was to analyse the sample's characteristics: social-demographic information, level of education, occupation or course of study of the participants (see **Figure 2**).

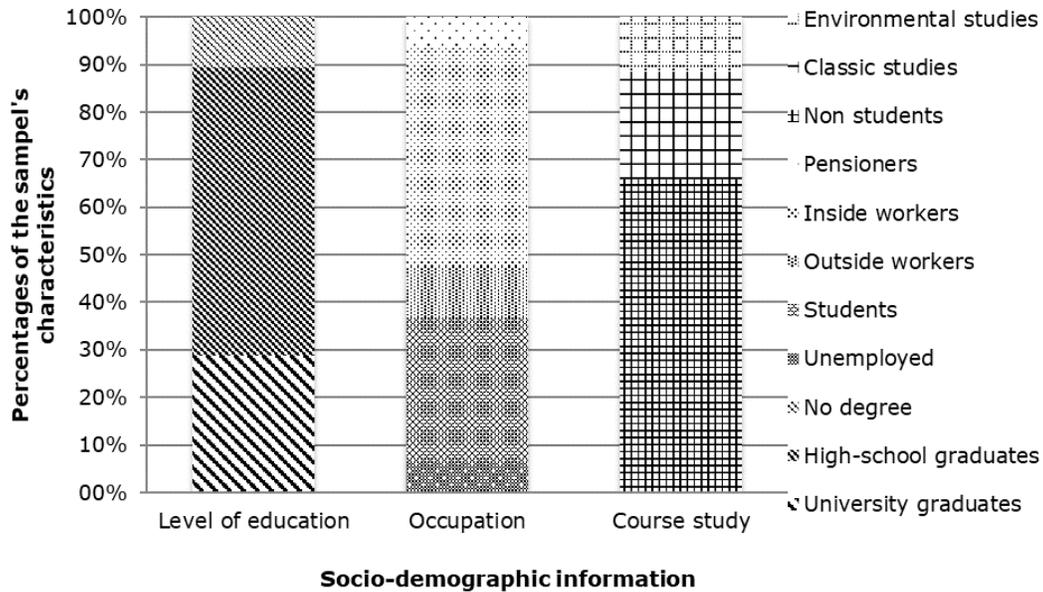


Figure 2: Graphical representation of the socio demographic characteristics of the sample.

Since students (30.3%) and office workers (46.1) were the most frequent categories within the 'occupational status', it was established whether any difference existed between these two groups on the preference scores for wildflowers. To this end, the mean score for the 6 categories (grouped items) and for each single item of the questionnaire was obtained for workers and students respectively, and independent samples T-test were run on these means. Concerning categories, one significant difference emerged for WUW: $t(71) = 2.39, p = .01$ (see **Table 2**). Considering single items, no significant differences emerged for preference except for picture shown in **Figure 3**, $t(56) = 2.75, p=0.01$, where students' preference score was 2.96 (SD = .86), while workers' score was 2.31 (SD = .90).

| | Occupation | Mean | St. Deviation |
|------------|----------------|------|---------------|
| WU | Students | 3.44 | .51 |
| | Office workers | 3.40 | .75 |
| WN | Students | 4.28 | .63 |
| | Office workers | 4.22 | .64 |
| SN | Students | 3.68 | .80 |
| | Office workers | 3.71 | .80 |
| SU | Students | 3.00 | .55 |
| | Office workers | 2.77 | .62 |
| WUW | Students | 2.35 | .59 |
| | Office workers | 2.00 | .67 |
| PP | Students | 3.85 | .86 |
| | Office workers | 3.95 | .59 |

Table 2: Mean preference score and SD for the 6 environmental categories (WU = Wild Urban, WN = Wild Natural, SN = Safety Natural, SU = Safety Urban, WUW = Wild Urban Winter, PP = Pre-Post) across Students and Office workers.



Figure 3: This picture depicts how wildflowers transform during summer and winter. Subjects were asked the following question: ‘This is an example of how wildflowers present themselves in winter after summer blooming. Do you like it?’

At this point we wanted to investigate whether differences between males and females existed. To this end, T-tests for independent samples were run on the preference scores of males and females for each category and for each single item. No significant results were found for the 6 categories (see **Table 3**), while only one significant difference emerged between genders for the preference of picture shown in **Figure 4**, $t(74)=2.28$, $p=0.03$ (males = 3.85, SD = .67; females = 3.37, SD = 1.05).

| | Gender | Mean | Standard Deviation |
|-----|--------|------|--------------------|
| WU | Male | 3.41 | .61 |
| | Female | 3.40 | .61 |
| WN | Male | 4.19 | .56 |
| | Female | 4.24 | .63 |
| SN | Male | 3.79 | .72 |
| | Female | 3.75 | .76 |
| SU | Male | 2.84 | .56 |
| | Female | 2.94 | .56 |
| WUW | Male | 2.32 | .72 |
| | Female | 2.28 | .71 |
| PP | Male | 3.65 | .83 |
| | Female | 3.90 | .73 |

Table 3: Mean preference score and SD for the 6 environmental categories across genders. WU = Wild Urban, WN = Wild Natural, SN = Safety Natural, SU = Safety Urban, WUW = Wild Urban Winter, PP = Pre-Post.



Figure 4: This picture shows a lizard amongst wildflowers. Subjects were asked the following question: ‘How much do you like this picture?’

This study aimed also to ascertain whether the presence/absence of a title on the questionnaire heading might influence participants’ judgements. To assess the so-called ‘context effect’ nearly half of the participants were given a version of the questionnaire with a title (‘title’ group), whereas for the other half no title was present (‘no title’ group). Independent samples T-tests run on the scores of the two groups for the 6 categories showed one significant difference only for WUW: $t(98) = 2.16, p = .03$. The same analysis run on each single item showed significant differences for 6 out of 25 items, as shown in **Figure 5**: Item_06: $t(74) = 2.61, p = .01$; item_11: $t(74) = -2.28, p = .03$; Item_17: $t(74) = 2.30, p = .03$; Item_20: $t(74) = -2.21, p = .03$; Item_21: $t(74) = -2.26, p = .03$; Item_26: $t(74) = -3.04, p = .00$. In the ‘no title’ group the item mean scores were significantly higher than the ‘title’ group (see **Table 4** and **Figure 5**).

These results suggest that the two versions are not totally equivalent.

| | Typology | Mean | Standard Deviation |
|-------|----------|------|--------------------|
| WU | Title | 3.41 | .55 |
| | No title | 3.40 | .68 |
| WN | Title | 4.21 | .64 |
| | No title | 4.24 | .56 |
| SN | Title | 3.81 | .70 |
| | No title | 3.72 | .79 |
| SU | Title | 2.90 | .51 |
| | No title | 2.90 | .61 |
| WUW * | Title | 2.44 | .71 |
| | No title | 2.13 | .68 |
| PP | Title | 3.68 | .87 |
| | No title | 3.93 | .64 |

Table 4: Mean preference score and SD for the 6 environmental categories (WU = Wild Urban, WN = Wild Natural, SN = Safety Natural, SU = Safety Urban, WUW = Wild Urban Winter, PP = Pre-Post) across the two versions of the questionnaire: 'title' vs. 'no title'. * = Significant difference

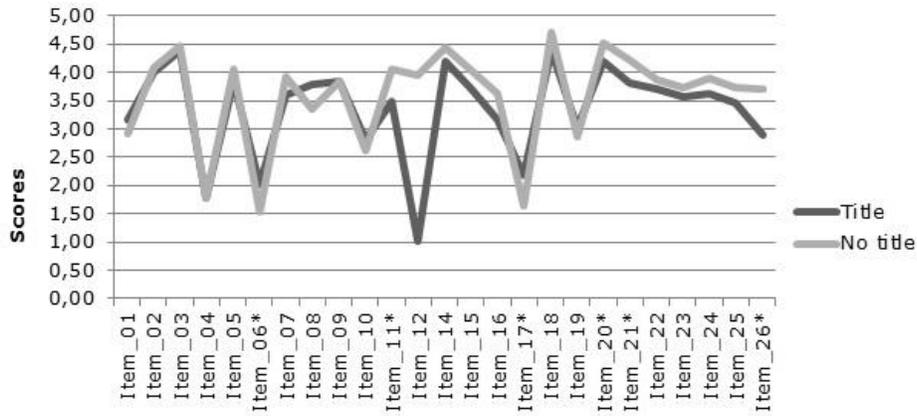


Figure 5: Mean preference score of each item (from 1 to 26 on x-axis) for the two versions of the questionnaire: 'title' vs. 'no title'. * = Significant difference

The questionnaire was composed of items that evaluate preferences for a series of questions on wildflowers where a picture was shown and a series of control items on the same issue without picture, i.e. control items. The control items were added to verify if the subject's preference judgments for such natural element may vary in relation to the presentation of the visual stimulus. From the paired sample T-tests the majority of the comparisons between pictures vs. items (no pictures) proved significant (see **Figure 6**).

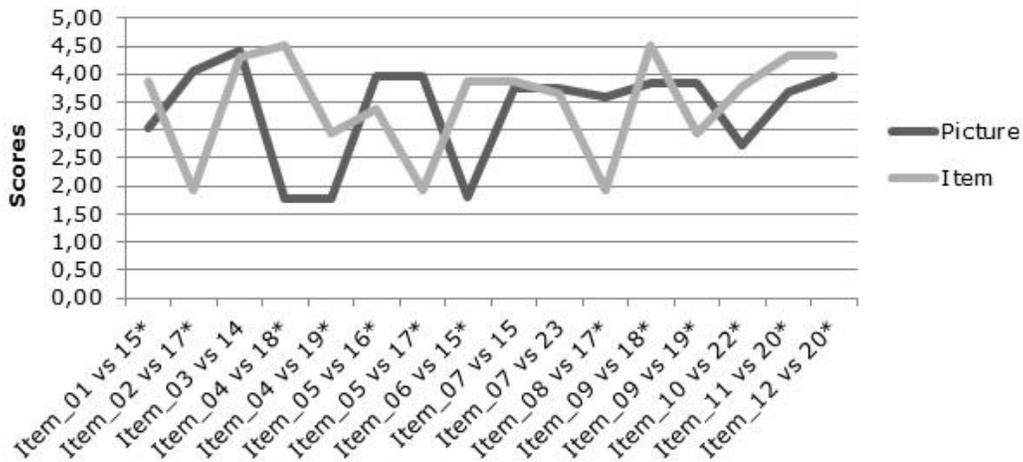


Figure 6: Mean preference score of each picture vs. the respective control item (without picture). * = Significant difference

On the contrary, no significant differences emerged for the picture shown in **Figure 7**, in comparison to the related control items ($p > .05$).



Figure 7: From left to right: picture on the left depicts wildflowers in a natural environment; in picture on the right wildflowers are cleverly used to mask railway tracks. Control item for picture on the left was: ‘Do you like seeing wildflowers when walking in a field or in the countryside?’ Control item for picture on the right was: ‘Would you like wildflowers to be used also in different contexts other from flowers beds, e.g. to mask the trams railway tracks’

Overall, results showed that participants’ preference judgements for an item were affected by the presence/absence of a picture.

Next paired sample T-tests, comparing the picture scores vs. the item control scores, were performed within the sub-samples males and females, and within the two typologies of the questionnaire, ‘title’ vs. ‘no title’. Results showed no significant differences within any sub-sample ($p > .05$).

Our sample was made of subjects with an age ranging from 21 to 75, subdivided into 3 groups in order to verify if differences existed among age groups. The division was from 21 to 35, 36 to 50, 51 to 75, so to have enough subjects in each group. For each age group mean preference scores were calculated for each category (see **Table 5**).

| | Age_group | Mean | Standard dev. | N |
|-----|-----------|------|---------------|----|
| WU | 21-35 | 3.36 | .55 | 45 |
| | 36-50 | 3.36 | .74 | 19 |
| | 51-75 | 3.54 | .86 | 12 |
| WN | 21-35 | 4.14 | .67 | 45 |
| | 36-50 | 4.47 | .45 | 19 |
| | 51-75 | 4.12 | .64 | 12 |
| SN | 21-35 | 3.64 | .75 | 45 |
| | 36-50 | 3.92 | .73 | 19 |
| | 51-75 | 3.95 | .49 | 12 |
| SU | 21-35 | 2.74 | .56 | 45 |
| | 36-50 | 3.00 | .52 | 19 |
| | 51-75 | 2.70 | .54 | 12 |
| WUW | 21-35 | 2.35 | .67 | 45 |
| | 36-50 | 2.39 | .67 | 19 |
| | 51-75 | 1.70 | .68 | 12 |
| PP | 21-35 | 4.01 | .68 | 45 |
| | 36-50 | 3.65 | .72 | 19 |

Table 5: Preference scores and SD of the 6 environmental categories across the 3 age groups. WU = Wild Urban, WN = Wild Natural, SN = Safety Natural, SU = Safety Urban, WUW = Wild Urban Winter, PP = Pre-Post)

| | | | |
|-------|------|-----|----|
| 51-75 | 3.41 | .84 | 12 |
|-------|------|-----|----|

A MANOVA was performed to see if age groups (fixed factor) affected the preference scores of the 6 categories. There emerged a significant effect of age on the category WUW, $F(2,76) = 4.50$, $p = .01$, and on PP, $F(2,76) = 3.90$, $p = .02$.

At this point, the Connectedness to Nature Scale (CNS) was considered. The CNS score, which comes from the average score of the 14 items, was calculated first for each subject and then for the entire sample. With a mean score of 3.27 (SD= 0.52) our subjects felt connected to Nature more than the average. An independent sample T-test was calculated to establish if there was any difference on the CNS scores of males and females. The males scored respectively 3.22 (SD = 0.58) while females 3.31 (SD = 0.48). There were no significant differences between the two genders, $p > .05$.

In order to see if significant differences existed among the 3 age groups, the CNS average score (and SD) was calculated for each age group (see **Table 6**).

| age_group | Mean | Standard dev. | N |
|-----------|------|---------------|----|
| 21-35 | 3.10 | .49 | 45 |
| 36-50 | 3.41 | .43 | 19 |
| 51-75 | 3.68 | .48 | 12 |

Table 6: Connectedness to Nature scores and SD across the 3 age groups.

A univariate ANOVA with age as fixed factor showed a significant effect of age on the CNS scores, $F(2, 76) = 7.86$, $p < .001$.

At this point a mean preference score for wildflowers in general was obtained from the mean scores of the 21 items of the questionnaire (socio-demographic questions and binary items excluded). For the entire sample mean preference for wildflowers was 3.51 (SD = .31). Wildflowers preference was then calculated for genders and age groups separately. The independent sample T-test run on the mean score of males (M = 3.51, SD = .30) and females (M = 3.51, SD = .33) showed no significant difference. Likewise, from the univariate ANOVA (dependent variable: wildflower preference, fixed factor: age, 3 levels) emerged no significant effect of age on preference scores (see **Table 7**), showing (once again) the sample's homogeneity concerning preference for wildflowers.

| age_group | Mean | Standard dev. | N |
|-----------|------|---------------|----|
| 21-35 | 3.49 | .32 | 45 |
| 36-50 | 3.60 | .34 | 19 |
| 51-75 | 3.44 | .25 | 12 |

Table 7: Wildflower preference scores and SD across the 3 age groups.

The last analysis concerned the relation between the preference for wildflowers in general and the feeling of being connected to Nature. To this end Pearson's bivariate correlation was used to evaluate the strength and direction of the relation between preference for wildflowers and connectedness to Nature. The correlation proved significant: $r = 0.35$ ($p < .05$). The same correlation was calculated for males and females separately. The correlation was significant only for males, $r = 0.59$ ($p < .05$). Concerning age groups, the correlation between preference for wildflowers and connection to Nature resulted significant only for the 21-35 years group: $r = .44$ ($p < .01$), the most numerous age group.

4. Discussion

The objective of this explorative study was to investigate the preference given to wildflowers in natural and anthropic environments. This research is part of a broader project aimed to evaluate if wildflower meadows are generally liked and if they could be good elements to add in urban areas. Overall, 96% of participants in our study liked wildflowers, they liked seeing flowers growing naturally in fields and in urban environments. Though in this study preference for wildflowers was addressed in a general way, a co-design perspective and the participation of the local community in a project of requalification of urban green has been taken into account. In this regard, it was hypothesised that the way an issue is presented to the citizens may affect how the issue is conceptualised, therefore affecting attitudes and preferences: *framing effect* (Tversky & Kahneman, 1981; Tversky et al., 1988). One of the most interesting results of our study refers to the differences in preference expressed for an item accompanied by a picture, which was generally higher than for the item that assesses the preference for the same construct without the photograph. This difference emerged for both males and females and for the two versions of the questionnaire 'Title' and 'No title'. It clearly emerged also that participants' responses were influenced by the presence of the title concerning the 'landscape aesthetic assessment'. The title surely gave an important insight of the nature of the study defining in the subject's mind a sort of 'reference framework' (Tversky & Kahneman, 1981). Though our results showed the two versions of the questionnaire were not totally equivalent, we decided to consider results from both versions together because they differed significantly only for 1 category out of 6, for a total of 6 items out of 25, actually $\frac{1}{4}$ of the items. However, except for the category Wild Urban Wild -WUW-, the two versions are consistent.

Environmental preference assessments should be immediate. They are evaluations driven by positive or negative emotions coming directly from the environment rather than from what we know about it (Russell & Snodgrass, 1987). As stated by Zajonc (1968) 'preferences need no inferences'. In this study the pictures served as a stimulus for a more spontaneous answer about wildflowers in the subjects. This result is very important to keep in consideration when involving the public in participated projects, because the methodology (project presented orally, showing images, calling participants to the study area, analysing their habitats/movements, interviewing them, etc.) chosen to present for example the redevelopment of an abandoned site can actually influence the citizens' attitude, evaluation and preference as regards the final design (McBurney & White, 2008).

As we know, wildflowers attract all sorts of wildlife, like small mammals, reptiles and birds. Although in an urban park the presence of these species might be of a concern for park users, the subjects interviewed gave very different answers on this matter. When asked if small animals could be a problem, responses were mostly all negative, but when shown actual pictures of bees and reptiles, they showed greater preoccupation. Nevertheless, no difference between genders emerged in the Connectedness to Nature Scale, the series of questions we submitted to measure how much an individual identifies with the natural world, i.e. feels to be part of it. On the other hand, in assessing the relationship between the preference for wildflowers in general and the sentiment of being part of Nature results showed this relation is significant only for males. In other words, wildflowers are appreciated by males only if they have a strong connection to the natural world. This result suggests it would be appropriate to set programs and activities in order to 'educate' and 'raise awareness' in males with the goal of bringing them closer to these typologies of plants, which are still not widely used as an urban feature.

One of the more curious result in this explorative research study was that, analysing males and females' answers, the hypothesis where the preference for wildflowers might be higher for females has not been satisfied at all. In fact, there wasn't an appreciable difference between the two genders when the entire questionnaire is considered. Only one significant difference has emerged for the preference given to the picture where a lizard was present. If we analyse the control item for the lizard picture, females did not differ in preference score to males, meaning that females do not like 'to see' that kind of animal but they know small mammals, insects, rodents and reptiles may be present in wildflower meadows. This allows us to speculate concerning the different preference score given to an item with the picture and it's control item, which concerns 'social desirability', i.e. the tendency to answer in a certain way in order to please the interviewer while hiding real opinions (McBurney & White, 2008). More often than not, subjects are convinced that a series of questions (opinions/generic evaluations) are a masked way to measure one's intelligence, social and/or emotional competence, or specific cognitive abilities. To become more socially desirable, they give false answers to seem more 'normal'.

The environmental category that registered the highest preference was Wild Natural – WN – because natural environments are preferred to urban environments (Purcell et al., 2001) and as a result of the tight relationship existing between environmental preference and perceived restorativeness (for a review see Berto, 2014), which means that we prefer those places that we immediately perceive as restorative, i.e. places that positively affect physical and mental health. A number of studies confirm that natural environments are perceived as more restorative than urban/artificial environments and that exposure to Nature is particularly effective in restoring from psychophysiological stress and mental fatigue (Berto, 2005; Berto, 2007; Berto, 2014) and for recreation, socialisation and environmental education (Kaplan, 1995; Bretzel et al., 2016). This is the reason for which urban design should reproduce more natural environments, combining natural elements (e.g. quantity, typology and disposition of vegetation, presence of water) and artificial (e.g. rocks, pebbles, sand), and be sufficiently extensive and consistent in order to engage and capture the involuntary attention for a relatively long period of time and promote exploration without any cognitive effort (Berto et al., 2008; Berto, 2011; Berto et al., 2015). In the category Wild Natural, no 'built' urban elements were present to remind the subject of environmental stressors like traffic, noise, air pollution, congestion, etc. In addition to that, natural scenes are usually more comprehensible and legible, i.e. they are easier to recognize and when necessary to acquire further information about them in comparison to urban scenes that on the contrary show high levels of complexity (Kaplan & Kaplan, 1989). In brief, preference that people manifest for green areas are due to a series of regenerative benefits, psychological and/or physical, resulting from a direct and frequent experience with Nature. In terms of preference for natural elements and restorative benefits strictly related, wildflower beds could serve the need for psychological restoration typical of urban dwellers.

In contrast, the environmental category with the lowest preference score was Wild Urban Winter – WUW –, in particular a picture depicting an urban area where natural elements were arranged in such a way to make the flowerbeds look scruffy and bare, indeed unpleasant (Figure 3). People expect to see Nature in an orderly fashion but ecological rich environments, such as wildflowers, tend to become disorderly during the winter period (Nassauer, 2002).

The most numerous participants in our study were students and office workers. Their answers differed significantly only for one photograph (**Figure 3**) where a wildflower bed is shown in winter when flowers are not really present and the bed looks dry. This difference might be because office workers are usually 'forced' to spend long hours in closed spaces, and at the end of the day might find greater pleasure in lush and orderly green flower beds. On the other hand, students are probably less concerned if flower beds are bare or dry, or with urban aesthetics in general, moreover they have more opportunities to surround themselves with natural elements by spending their time in parks and gardens during lunch time or in between lessons.

Preference for wildflowers seems to vary in relation to age. Significant effects emerged in the age group 51-65, specifically for the environmental category Wild Urban Winter – WUW – and the age group 66-75 for the category Pre-Post – PP –, where wildflowers are shown in summer and in winter, where flower beds are shown without and with flowers. In the first age group, the difference can be

based on cultural factors. In the 1960s and 1970s, at the onset of adolescence where we form our personal identity, there was little talk about green spaces or on Nature and the benefits deriving from them, but rather on industrialisation and the economic boom that characterised that period (Daniele & Malanima, 2011). This led to less awareness of the topic of Nature, today very common, probably resulting in low preference scores. For the 66-75 age range, we can imagine that subjects involved understand the implications needed in a project, e.g. the enormous investments needed for its realisation or the risk of abandonment of the areas once completed by local authorities and/or by citizens, but they might also prefer to spend public funding in other alternative more beneficial ways like in public health or in road safety. The younger generation might give less importance to the factors cited above and prefer to see degraded areas turned into aesthetically pleasing 'green' areas, with the chance to spend time with family or in different sport activities i.e. basketball, football, running.

Also for the Connectedness to Nature Scale, we wanted to ascertain if there were any differences between the 3 age groups on the average score. We found that the connection to Nature within the subjects increases with ageing. Around the age of 20, we feel slightly connected and develop a strong connection towards 65. For the participants with ages between 21 and 50, the connection is not very high. The relation with Nature might become secondary because of being more attracted by other interests (e.g. finishing school, working, starting a family, etc.). For example, when we are close to adolescence, although interest for aesthetics appears, everything rotates around the formation of personal identity and building relations with peers and there is less interest in the surrounding environment (Barbiero & Berto, 2016). Towards the end of the working life (age group 51-65), the connection with Nature reaches high scores probably because the regenerative, psychological and physical benefits deriving from direct contact with Nature becomes more important as a result of fatigue and exhaustion generated in people after long years working and the difficulty of keeping up with the new working rhythms (Angeli, 2014). During retirement, the connection may slightly decrease, probably because, having more free time, people tend to stay for longer periods of time surrounding themselves with what Nature has to offer, getting used to it, a tendency acquired through the frequent repetition of that same thing (Aloisi, 2014).

In general, any type of achievement (in economic, environmental and ease of cultivation terms) is preferred compared to costly installation. In this regard participants were asked also to answer questions on transferring the up-keep of flowerbeds and parks/gardens from local authorities to the public with the goal to reduce maintenance costs. Results show that subjects are favourable but not as much as we might have thought. It is possible that transferring complete control to people with 'poor' knowledge is not one of the best ways to reduce costs: there may be eventually a loss of interest and abandonment, or alteration of the sites' original function for personal gain. Participants gave, however, higher scores to the idea of involving citizens in the realisation of city flowerbeds. Local authorities should consider implementing more activities that involve the public, one of the most efficient ways to reduce vandalism and urban degrade is to let people take part in the decision processes but most importantly to create their own urban spaces. This participation brings people together, informs them about their surroundings and how they could change, creates links between citizens, the environment and local authorities because it's an intervention that they contributed to create (Toccolini & Fumagalli, 2009).

5. Conclusion

Literature shows that wildflowers represent a valid instrument to improve the biodiversity and the landscape of the Mediterranean urban ecosystem and can constitute models in terms of landscape management, e.g. hide railway tracks, cover embankments, traffic islands, in cemeteries, for school projects, in industrial and waste disposal areas heavily modified by man (Köppler et al., 2014). Wildflowers are versatile plants which can be successfully duplicated in anthropized areas to mitigate the negative effects of human activities in the city and enhance the biotic component with low management cost (for a review see Bretzel et al, 2016). However, in our study focused on people's preference for these flowers, we found that the different use of wildflowers from the usual flower beds may be challenging because people are more used to and accordingly prefer the ornamental

vegetation, e.g. well-kept mown grass and tidy flowerbeds (Tyrvaäinen et al., 2007; Qiu et al., 2013). Indeed, people see wildflower meadows in areas that differ from the usual flowerbeds as too demanding and complicated to create, and for the same reason there might be less will on the part of local authorities to truly commit themselves to studies and projects that require dedication, time and effort. Actually, cultivation techniques and maintenance of wildflower meadows/beds are not as economical as we might think in the short period but become sustainable from the second year of installation. The use of a proper species mixture with grass and leguminous plants, able to guarantee the soil fertility and a balance in species during time, is needed. Native species must be preferred. Wildflowers are costly when it's time to seed as a result of the work needed to prepare the soil and the care needed in its first year of growth due to the soil seed bank (weeds that stay dormant in the first few layers of soil which might become dominant) (Scotton et al., 2012; Lloyd, 2014). In addition to that, wildflowers are pretty to look at from spring to autumn but once the life cycle of the plant ends, the flowerbeds quickly turn into a sprawl of dead grass that could make the area look untidy and uninviting. Only knowledge of the characteristics of wildflowers can help people understand and accept that for short periods the beauty associated to these flowers vanishes and is substituted by dead and shriveled plants. People should also be helped to accept the presence of small mammals, reptiles, and pollinators, which comes with wildflower meadows.

In conclusion, there are two main limitations of this study: the small sample involved and the fact that familiarity for wildflowers was not assessed. At the same time, it is important to ascertain whether a relationship between familiarity and preference for these natural elements exists.

Further research is needed in order to inform more precisely decision-makers, urban green space designers and managers about citizens' preferences for wildflowers. In the meantime, if local authorities informed citizens about the ecological benefits arising from wildflowers, educating them on the natural cycles of the plants, on the perception of time in Nature, there would be more comprehension towards wildflowers and a greater will to utilize them in urban projects and ideas. Within this framework, recently, several projects of citizen sciences have been developed, also involving disadvantaged people, with a positive effect on their psycho-physical health (see, for example, www.farfalleintour.it). Although exploratory, results from this research study are encouraging, showing that people like seeing wildflowers in different urban settings and that they can be considered a good example of a Nature-based solution in the case of low maintenance strategy of urban greening.

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