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NATURAL RURAL LANDSCAPE PERCEPTION AND RESTORATIVENESS

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ABSTRACT

There is wide evidence of the positive effects on health and well-being associated with exposure to natural environments. The benefits are related to the perceived restoration from mental fatigue. The literature suggests that the restorativeness depends on the specific characteristics of the setting but also on a characteristic of the subject, called "Connection with Nature". Better understanding these relations, could give important indications to planners, landscape managers and designers. Aim of the research is to investigate the characteristics of the natural rural landscape that influence its preference and perceived restorative quality. Four study areas, in Italy, have been selected, different for degree of protection and wilderness, distance from the nearest metropolitan area (Milan) and landscape characteristics. 435 subjects, approached on-site, accepted to participate and were administered a questionnaire with three scales: (1) the Perceived Restorativeness Scale-11 (PRS-11), with two additional items to assess familiarity and preference; (2) 16 physical and aesthetic attributes; (3) the Connectedness to Nature Scale (CNS).

The data show that the user preference is for harmonious (congruence between its elements), varied and rich in natural elements landscapes, and that the preference is strongly and directly related with the familiarity with the place and its perceived restorative quality.

KEYWORDS

Health and Well-being; Natural Environment's Perception; Preference and Perceived Restorative Quality

1   INTRODUCTION

There is wide evidence of the positive effects on health and well-being associated with exposure to natural environments (for a review see Berto, 2014). The benefits are related to the perceived restoration from mental fatigue, caused by all the situations that during the day call for voluntary directed attention. Mental fatigue implies the inhibition of voluntary attention and the increasing of not controlled distractions. The activation of mechanisms able to restore directed attention capacity is, therefore, fundamental. Direct contact with Nature mainly activates bottom-up involuntary attention so energy does not need to be directed towards suppressing such "distracting" stimuli (Berto et al., 2018). In the Attention Restoration Theory (ART) (Kaplan, 1995), this type of involuntary effortless attention is indicated as "fascination" and the capacity to generate fascination is the most important characteristic of a restorative environment.

The literature suggests that the restorativeness depends on the specific characteristics of the environment but also on a characteristic of the human being, called "Connection with Nature" (Tang et al., 2015). In fact, some studies have shown that many people do not seem to perceive the restorative qualities of nature and, thus, do not generate a preference for such environments (Hartig et al., 2007).

The characteristics of the environment influencing preference can be used as true predictors of it (Coeterier, 1996; Ingegnoli et al., 2016; Purcell & Lamb, 1998; Sevenant & Antrop, 2009; Tveit et al., 2006; Wherrett, 2000; Zyngier et al., 2014;). Better understanding of how people become aware of the positive benefits associated with exposure to natural environments and of the related environmental factors is very useful for planning, design and management of natural landscapes where the main function is tourism-recreation.

The objective of the present study is to verify the key factors of the preference of natural environments and to understand the relationships that exist with the perceived restorativeness and the connection with nature.

2   METHOD AND STUDY AREAS

2.1   METHOD

As people may react differently when they are in a natural environment compared with when simply observe images of that environment (Millar & Millar, 1996), we decided to administer a questionnaire to our subjects during their visit to a natural area. The questionnaire includes the following scales/items:

−   age, gender, education, profession and residential location;
−   frequency, duration, motivation and "With whom" of the visit;
−   a list of 16 physical and aesthetic attributes to assess the setting;
−   the Perceived Restorativeness Scale-11 (PRS-11) to assess the setting perceived restorativeness;
−   two additional items to assess "familiarity" and "preference";
−   the Connectedness to Nature Scale to assess subject's sense of connection to Nature.

The definition of the list of physical and aesthetic attributes to assess the setting has been based on the available literature on the landscape perception (Gruehn & Roth, 2010; Kamičaitytė & Janušaitis, 2004; Sevenant & Antrop, 2009; Tang et al., 2015; Zhang et al., 2013).

We decided to use, first of all, the sensorial and semiotic aesthetic attributes defined by Nasar (1994) that can be effectively used also for natural landscapes (Hidalgo et al., 2006). These attributes are described by 11 items: 1) Vegetation, 2) Visual diversity/richness, 3) Harmony/congruence among different elements, 4)

Openness and/or spaciousness, 5) Luminosity, 6) Historic or representative place, 7) Cleanliness, 8) Maintenance/upkeep, 9) Place for leisure activities, 10) Meeting place, 11) Novel place.

To these, we added other five items: 12) Accessible, 13) Safe, 14) Quiet and silent, 15) Crowded and 16) Artificial. All the 16 attributes are rated on a 1 to 5-point scale, where 0 = not at all, and 5 = a lot.

The PRS measures an individual's perception of the restorativeness of an environment (Hartig et al., 1997) and is based on the Attention Restoration Theory (Kaplan, 1995). According to ART, what makes an environment "restorative" is the limited need for directed attention (that requires effort) and Nature's capacity to entice involuntary attention (that doesn't require effort) (Berto et al., 2018).

In the present study, we decided to utilize the PRS-11 version (Pasini et al., 2014), with 11 items divided in four restorative factors:

− being-away; a restorative environment provokes a sense of being-away, due to both the change of landscape compared to everyday life and a detachment from commitments and concerns;

− fascination; it is the main component of the regenerative experience. This "involuntary attention" is due to particular landscape components that stimulate curiosity and sensations;

− coherence; it refers to a physically and conceptually ordered environment that fosters its exploration and understanding. The environment is perceived as one with a wider organizational structure;

− scope; it refers to spatial and temporal characteristics of the environment in relation to accessibility, absence of restriction to the movements and the possibility of spending time there.

We added 2 other items to the PRS-11 to investigate familiarity ("this place is familiar to me") and preference ("I like this place"). All these 13 items are rated on a 0 to 10-point scale, where 0 = not at all, 6= rather much, and 10 = completely. The Connectedness to Nature Scale (CNS) (Mayer at al., 2004) measures the extent to which people feel a part of the natural world. It is a positive personality characteristic that improves cognitive capacity, emotional well-being, positive mood, and happiness. People who have greater experiences of the natural environment may express greater affective connection to it than those with less experience Berto et al., 2018). The scale is made up of 14 items and judgments are made on a 1 to 4-point scale, where 1 = never and 4 = always.

A total of 524 subjects older than 18 years of age were approached on-site; of those, 435 (83%) accepted to participate in the research study: 239 males and 196 females, aged 18-85 years (M = 44.17 years, SD = 16.96). The participants were chosen using a convenience sampling procedure.

The same procedure was used for each setting. The on-site administration was conducted during a six-week period from early August to mid-September 2015, on weekdays and weekends and under the same sunny weather condition. Times of day and day of the week were counterbalanced in order not to under or over represent certain types of visitors. Participants were first given a general overview of the study, then they were asked to answer the questionnaire, for approximately 10–15 min. There was only one researcher administering the survey and he remained available during and after the completion of the questionnaire for any additional questions.

Participants' inform consent was obtained and confidentiality was guaranteed.

2.2 STUDY AREAS

The questionnaire has been administered in four study areas (Fig. 1) in Italy (three protected natural areas and an urban park), different for degree of protection and wilderness, distance from the nearest metropolitan area (Milan) and landscape characteristics (Fig. 2).
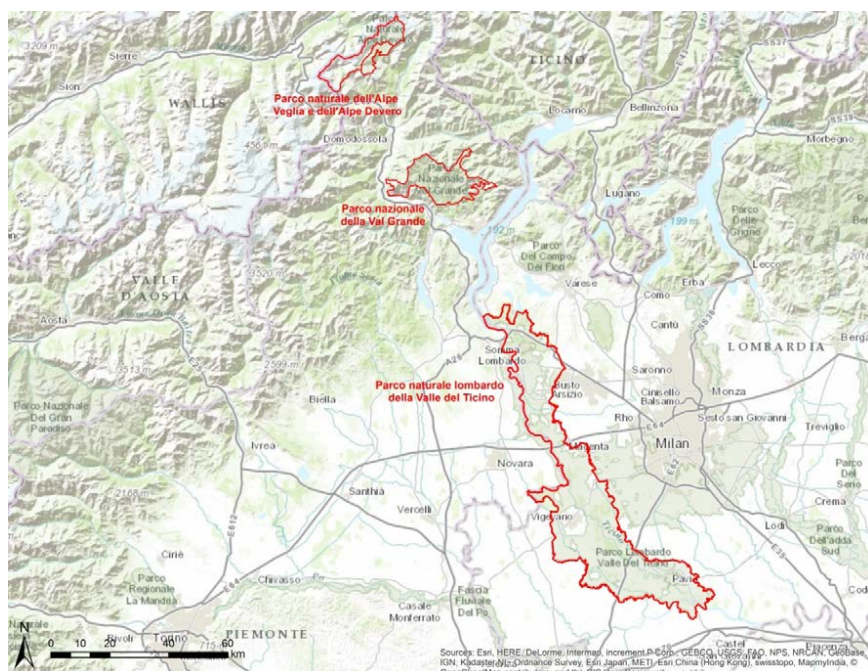
Fig. 1 Map of the four study areas

The three Italian protected natural areas are: Valle del Ticino (a Biosphere Reserve), Val Grande (a National Park) and Alpe Veglia – Alpe Devero (a Natural Park). These parks were selected from a previous research study conducted on 1390 subjects aimed to compare Italian, Austrian and Polish protected areas (Jiricka-Pürrer et al., 2017). Regarding the Italian parks, the study showed that they differed significantly on several items measuring physical-aesthetic appearance. On this basis, we thought plausible to use these settings in our research study. A forth setting was added: Trenno (a peri-urban park in Milano), that can be considered as a sort of control condition, because it is not characterized by high naturalness.

3   RESULTS

3.1 CHARECTERIZATION OF THE RESPONDENTS

The characterization of the respondents shows a certain variability in the different parks, with some important differences. Trenno has more than 35% of the respondents over 65 years and Devero less than 5% (with an average of almost 15%) (Fig. 3). This clearly demonstrate the different typology of these parks and of the people frequenting them. Trenno is a peri-urban park easily accessible (more than 90% of the respondents live in a 10 km radius; see Fig. 4), whilst Devero is far from the city (more than 50% of the respondents live over 100 km; see Fig. 4). The number of people over 65 decreases with the increase of the distance from home. The duration of the visits increases and the frequency of the visits decreases with the distance from home (Fig. 4), indicating that people that go far from home try to maximizing the time.

Natural Park of Veglia and Devero Alps. It is a Regional Protected Area of 8500 ha, with a typical alpine landscape (meadows and pastures, ponds and streams, small traditional rural villages). It is 160 km far from Milan (2h20' by car).

Val Grande National park. It is a National Protected Area of 14600 ha, characterized by a great wilderness with very different landscapes due to the great morphological and altimetric differences (over 2200 m): narrow torrential valleys covered by dense forests of broadleaf with at higher altitudes alpine meadows and rocky walls. It is 110 km far from Milan (1h50' by car).

Ticino Valley Regional Natural Park. It is a Regional Protected Area of 91800 ha, with a landscape characterized by lowland forests, agricultural areas and by the presence of the Ticino river. Very accessible park, with numerous urban areas included in the protected area boundaries. It is 50 km far from Milan (1h by car)

Trenno Park. It is a peri-urban green area of 59 ha in the north surroundings of Milan, with a fairly homogeneous and typical agricultural landscape characterized by long boulevards of Lombardy Poplars (Populus nigra 'Italica') that divide large lawns used for various sports activities. It is a highly accessible green area, 10 km far from Milan (20' by car).

Fig. 2 Description of the four study areas

Age of the respondents

	18-24	25-34	35-44	45-54	55-64	>65
Devero	16,7	23,0	16,7	20,4	20,4	2,8
Val Grande	17,6	14,8	16,7	26,8	26,7	7,4
Ticino	20,2	23,7	11,4	20,2	14,9	9,6
Trenno	11,4	13,4	20,0	5,7	11,4	38,1
Average	16,5	18,9	16,1	18,4	15,9	14,2

Classes of age of the respondents

Fig. 3 Age of the respondents

Distance from home, frequency and duration of the visits of the respondents

Devero Val Grande Ticino Trenno Average
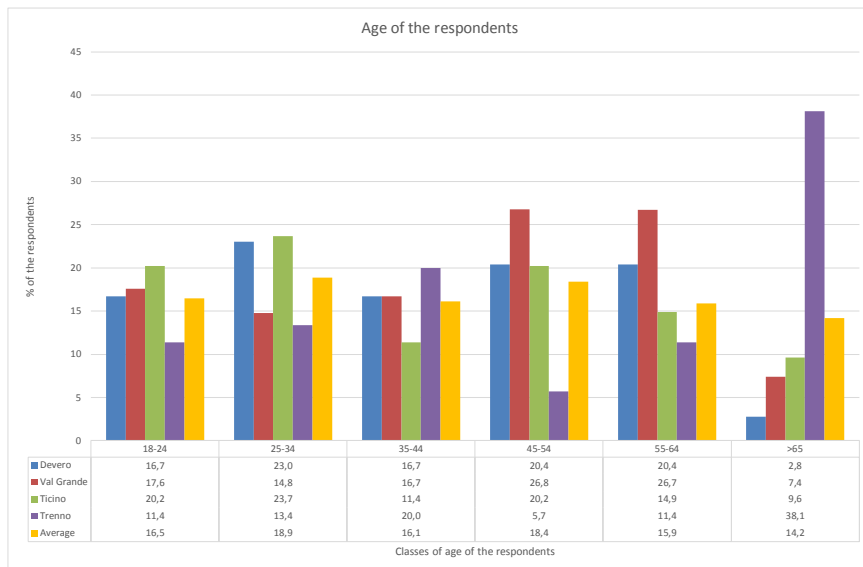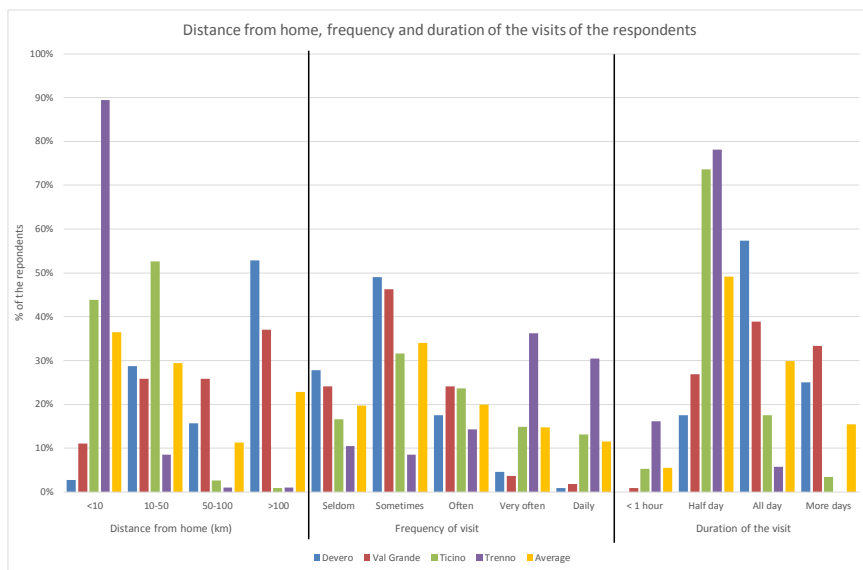
Fig. 4 Some characteristics of the respondents

3.2 PHYSICAL AND AESTHETIC ATTRIBUTES OF THE STUDY AREAS

The variability of the 16 physical and aesthetic attributes in the four parks is evident (Fig. 5). Nevertheless, for 8 of the 16 attributes Devero and Valgrande present a rating greater than the average. Moreover, it emerges that Ticino has a very low rating for cleanliness and maintenance and Devero is perceived crowded as Trenno.

There is a clear division between attributes inherent to the physical characteristics of the landscape, where Devero is almost always the highest, and "social" attributes, where the major averages are for Trenno. There is also a tendency towards the formation of two groups: the two mountain areas (Devero and Val Grande) often obtain similar results; the same happens to the two plain areas (Ticino and Trenno) which, despite extremely different characteristics, often have very close average scores.

To better understand these results, the 16 physical-aesthetic attributes were grouped into 5 factors, through a Principal Components Analysis (PCA) made with the IBM SPSS Statistics software:

— quiet place, well maintained and managed (attributes: [7] Cleanliness, [8] Maintenance, [13] Safe, and [14] Quiet and silent);

— harmonious place, varied and rich in natural elements (attributes: [1] Vegetation, [2] Visual diversity, [3] Harmony/congruence, [6] Representative place, and [11] Novel place);

— open and bright place (attributes: [4] Openness and [5] Luminosity);

— place that facilitates relaxation and sociality (attributes: [9] Place for leisure activities, [10] Meeting place, and [12] Accessible);

— crowded and artificial place (attributes: [15] Crowded and [16] Artificial).
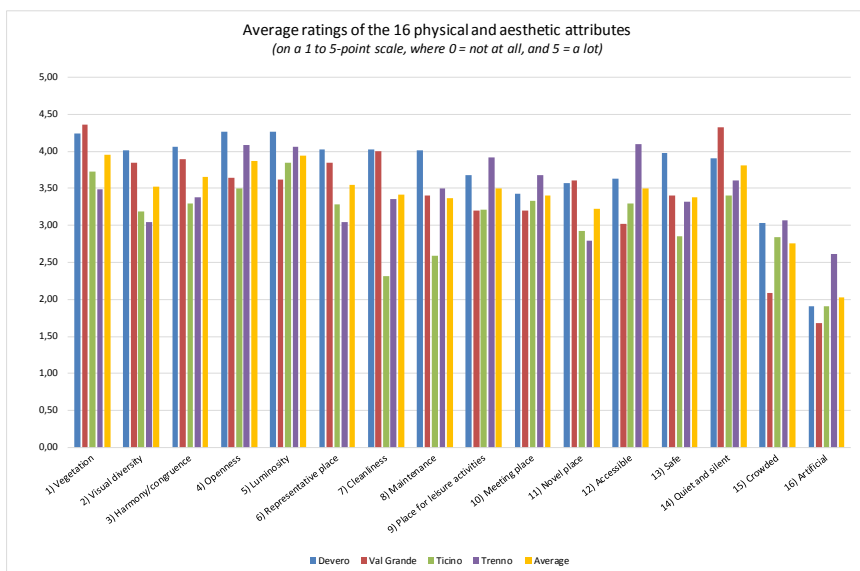
Fig. 5 Ratings of the 16 physical and aesthetic attributes
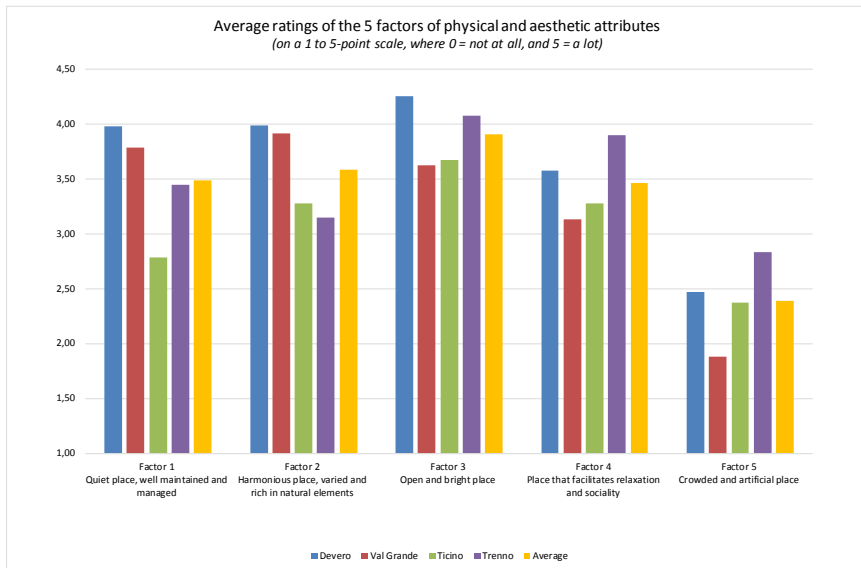
Fig. 6 Ratings of the 5 factors related to physical and aesthetic attributes

3.3 FAMILIARITY, PREFERENCE, PRS AND CNS

Regarding the familiarity, the high score of Trenno (8.45) was expected, due to the fact that the majority of respondents come from very close. On the other hand, the Ticino score (6.89) is much lower than Devero, although respondents know better the area (only 9.65% of the Ticino respondents were the first time they visited the area, compared to 30.56% of Devero).

Regarding the preference, the average scores for Devero (9.08) and Val Grande (8.94) are very high. A little surprisingly, the third best score is that of Trenno (8.02) which exceeds, even quite clearly, Ticino (7.65), although the latter is much less artificial and much more varied and rich in vegetation.

The average PRS scores follow the order of the preference: the two mountain areas show significantly more positive scores (Devero: 7.83, Val Grande: 7.44) compared to Trenno (6.37) and Ticino (6.24). The situation is very similar for regenerative factors ("Being-away" and "Fascination"), while the trend is different for the "Coherence" factor. Devero has a higher average score (7.27) followed by Trenno (6.68) with its extreme homogeneity and linearity. The Ticino average is very low (5.42): probably this is the factor that influences familiarity and preference. Finally, for the last "Scope" factor, linked to the possibility of exploring, to the variety and the curiosity that a landscape can generate, there are clear differences between the different areas (Fig. 7). The CNS, which should be an independent variable linked to the individual, is higher for landscapes with greater naturalness. The respondents in the two mountain areas show an average CNS value (1 to 4-point scale) above the overall average (3.29): Devero 3.41 and Val Grande 3.38. On the other side, respondents in Ticino and Trenno show a lower average value: Ticino 3.26 and Trenno 3.12.

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Average ratings for Familiarity, Preference and PRS

Devero ■ Val Grande ■ Ticino ■ Trenno ■ Average
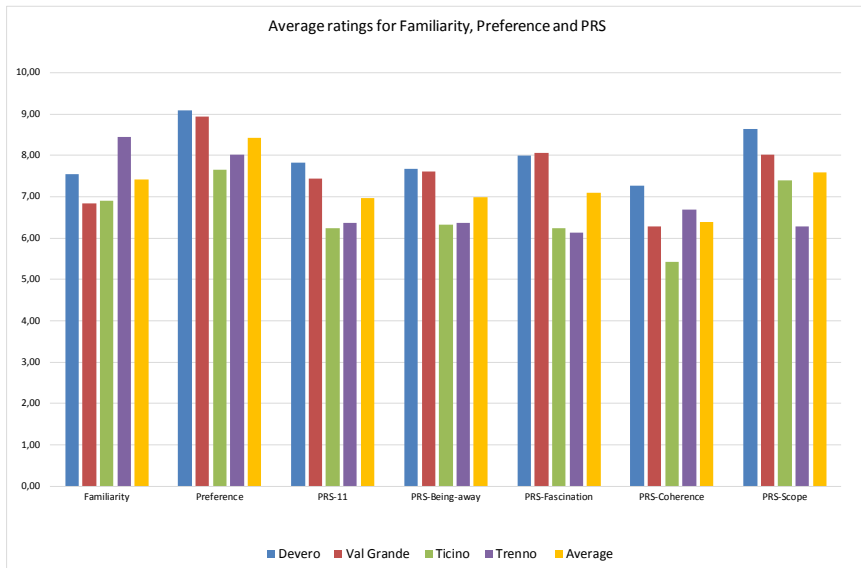
Fig. 7 Ratings for Familiarity, Preference and PRS

4   DISCUSSION

The collected data were analyzed in order to verify the reciprocal influences, through one-way and two-way ANOVA and through Pearson's bivariate correlation. With regard to the characteristics of the respondents, no variable showed important correlations with the preference, except for the visit duration and the distance from home that showed significant correlations at the 0.01 level (respectively 0.321 and 0.211). CNS presents a significant correlation at the 0.01 level both with preference (0.204). and PRS (0.348). The relationship between CNS and PRS is however influenced by the type of landscape. In fact, it can be seen (Tab. 1) that in the least preferred area (Ticino) there is not even a significant correlation, while in the most preferred area (Devero) there is a significant correlation at the 0.01 level much higher than all the other areas (0,509). The connection with nature is the only individual characteristic that is able to significantly influence the PRS, particularly in environments with high landscape quality. Users who have a greater connection with nature can better perceive the restorative capacity of the landscape and consequently benefit from a better attention restoration and stress recovery.

The physical-aesthetic attributes of the landscape play a significant role on the environmental preference. In the different study areas, they correlate differently because the type of use and the characteristics of the landscape vary (Tab. 2).

The preference correlates significantly at the 0.01 level with all factors except the last (as was expected). The first two factors are those that correlate most with preference: it is the tranquility and good management of the area, its diversity and visual and vegetative richness, as well as harmony. Factor 2 has a particularly high correlation (0.551): it is the factor that best embodies the concept of naturalness reported in the literature as a great predictor of preference. These first two factors are certainly excellent predictors of the preference judgment.

Area		CNS	Preference	Familiarity
Total	PRS	0.348 **	0.691 **	0.340 **
(all respondents)	CNS		0.204 **	0.128 **
	Preference			0.421 **
Devero	PRS	0.501 **	0.615 **	0.532 **
	CNS		0.232 *	0.243 **
	Preference			0.531 **
Val Grande	PRS	0.293 **	0.625 **	0.237 *
	CNS		0.192 *	0.218 **
	Preference			0.296 **
Ticino	PRS	0.173	0.727 **	0.390 **
	CNS		0.145	0.087
	Preference			0.581 **
Trenno (control)	PRS	0.341 **	0.575 **	0.513 **
	CNS		0.153	0.124
	Preference			0.537 **

** = correlation is significant at the 0.01 level (two-tailed)
* = correlation is significant at the 0.05 level (two-tailed)

Tab. 1 Pearson's correlations between CNS, PRS, Preference, and Familiarity scores

The direct influencing effect of familiarity on the preference of the landscape is clearly evident, with a significant correlation at the 0.01 level of 0,421. Familiarity is also correlated with the physical-aesthetic factors of the landscape (Tab. 2), even if not in a high way. All the physical-aesthetic factors of the landscape correlate significantly at the 0.01 level with Familiarity and, except for Factor 5 (Crowded and artificial place), with the PRS. There is a very high correlation (0.620) between PRS and Factor 2 (Harmonious place, varied and rich in natural elements).

Factors	Preference	Familiarity	PRS	CNS
Factor 1 - Quiet place, well maintained and managed	0.353 **	0.119 *	0.408 **	0.085
Factor 2 - Harmonious place, varied and rich in natural elements	0.551 **	0.149 **	0.620 **	0.204 **
Factor 3 - Open and bright place	0.261 **	0.190 **	0.315 **	0.113 *
Factor 4 - Place that facilitates relaxation and sociality	0.142 **	0.194 **	0.235 **	0.079
Factor 5 - Crowded and artificial place	-0.082	0.160 **	-0.003	0.014

** = correlation is significant at the 0.01 level (two-tailed)
* = correlation is significant at the 0.05 level (two-tailed)

Tab. 2 Pearson's correlations between Preference, Familiarity, PRS, CNF and the 5 factors related to physical and aesthetic attributes

It is interesting to analyze not only the PRS, but also its factors to understand what makes a landscape more restorative and what mostly influences the preference (Tab. 3). Our study confirms a very strong correlation between PRS and preference (0.691). Observing the individual regenerative factors of the landscape, stands out the correlation between preference and fascination (0.722), confirming what emerges from the literature that indicates this factor as the most important.

	PRS-11	PRS Being-away	PRS Fascination	PRS Coherence	PRS Scope
Preference	0.691 **	0.569 **	0.722 **	0.451 **	0.478 **

** = correlation is significant at the 0.01 level (two-tailed)

Tab. 3 Pearson's correlations between Preference, PRS, and the 4 factors describing the perceived restorativeness

5 CONCLUSION

The present study confirmed that the preference is directly influenced by the individual connection with nature (Tang et al., 2015). We found a significant correlation between the two variables, even if not very high (0.204).

In the present study, on the contrary, a significant correlation between preference and familiarity (0.421) emerged; this strong correlation compared to what emerged from the literature is probably due to the methodology used (on-site survey). Familiarity is well correlated with the PRS and, in particular, with its Coherence factor (0.352). In the study areas where the familiarity is greater, the correlation with the PRS becomes important, with values above 0.500. Just the influence of familiarity could explain the higher scores of both PRS and preference of Trenno respect to Ticino.

The study confirms, then, the hypothesis that the areas with greater naturalness are the preferred ones and that they give a greater perceived restorativeness. The significant correlation between PRS and preference (0.691) is very high, confirming that the main restorative factor is fascination (its correlation with the preference is 0.722).

The study also confirms that the connection with nature correlates significantly with PRS (0.348), and that in environments with greater naturalness the link between the two variables is even more intense (in Devero the correlation between CNS and PRS is 0.509, while in Ticino there is not even a significant correlation between the two variables).

Regarding to the physical-aesthetic characteristics of the landscape, the highest significant correlation has been registered between the PRS and the Factor 2 "Harmonious place, varied and rich in natural elements" (0.620) and consequently with the relative landscape attributes (vegetation, visual diversity, harmony/congruence, representative place, and novel place).

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