

Article

Exploring the Relationship Between Restorativeness, Environmental Risk Perception, and Well-Being: The Case Study of Piazzola sul Brenta

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Abstract: Urban environments in Northeastern Italy, both natural and historical, are exposed to urbanization, climate change, and environmental risks that can impact perceptions of environmental quality and sustainability. However, the relationship between the perceived environmental risks, the related emotions, and the quality of urban living and well-being remains underexplored. The present study, therefore, aims to investigate the link between the perceived risk of adverse events and the emotion felt about the possibility of damage to historically and economically valuable sites, as well as the residents' restorativeness, well-being, residential satisfaction, and sense of community. Participants completed online questionnaires addressing the following variables: perceived risk of environmental events; emotions of possible damage; restorativeness; well-being; residential satisfaction; and sense of community. The results showed negative relationships between perceived risk and residential satisfaction, well-being and restorativeness, but positive relationships between negative emotions of losing places of economic value and residential satisfaction, sense of community, and restorativeness. The findings highlight the role of emotions and restorativeness with well-being and satisfaction in residents of Piazzola sul Brenta (Italy).

Keywords: restorativeness; perceived environmental risk; emotion; Northeastern Italy



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1. Introduction

The present study is part of the Interconnected Nord-Est Innovation Ecosystem project focusing on the interaction between individuals and their environments in Northeastern Italy. The region of the Northeast of Italy is a geographical area known for being one of the most air-polluted in the country, with increasing levels of urbanization [1]. In addition, this region is severely affected by climate changes, such as rising temperatures and weather phenomena [2,3]. As a result, environmental stressors, such as noise, overcrowding, traffic, pollution, and climate change, increasingly affect residents of urbanized areas [4]. It is well known that such stressors can have a negative impact on people's health and psychological well-being [4,5].

A possibility of counteracting and reducing these negative effects is through restorative environments [6]. An environment is considered restorative if it can improve recovery from stress and mental fatigue, enhancing individuals' well-being [7]. Growing evidence suggests that exposure to restorative environments, especially natural ones, can positively impact people's cognitive, psychological, and psychophysiological resources [8–10]. Restorative environments can evoke, for example, feelings of fascination, capturing our interest and attention, or they offer a sense of "being away", providing an escape from the daily routine. Such characteristics can improve people's cognitive performance [7], mood,

and enhance relaxation, which can be depleted by everyday stress and the demands of sustained attention [7,10].

Most research on restorativeness centers on nature and its effects, as the concepts of the Biophilic hypothesis [11] and theories of restorativeness—such as Stress Reduction Theory and Attention Restoration Theory [7,12]—originated from studies on nature's role. Consequently, there is comparatively less understanding of how, or to what extent, built urban environments might foster restoration and support individual well-being. Only in recent years have studies begun to demonstrate the restorative potential of historical environments [13,14]. However, research on these environments is scarce, and studies have generally measured people's perceived restorative characteristics of images of historical environments. To our knowledge, no studies have explored the perceived restorativeness of living in historical places and cities. Specifically, Northeastern Italy conserves several urban realities with natural surroundings and preserved monumental emergencies of historical–architectural importance, where the everyday lives of residents are deeply intertwined with these environments. Considering its ongoing urbanization alongside the presence of historical sites and heritage, the Northeast emerges as a fragile region, making it a particularly suitable area for in-depth study of these aspects.

In addition to restorativeness, historical sites in general can have a positive impact also on the well-being of individuals and communities [15]. For example, a visit to a historical place can improve well-being and reduce stress [16]. Moreover, using historical sites as part of therapeutic activities can improve the well-being of participants with mental health issues [17].

When examining the relationship between historical environments and well-being, however, it is essential to recognize that well-being is a complex and multicomponent construct. One of its components is mental well-being consisting of a dynamic interaction between external circumstances and psychological states, which work together to meet individuals' psychological needs, ultimately leading to positive emotions such as happiness and satisfaction [18,19]. Moreover, within urban communities, well-being can be expressed as residential satisfaction such as the evaluation of inhabitants regarding the pleasure or satisfaction of residing in a certain location and the overall evaluation of residential environment considering different scales (e.g., house, building, neighborhood) [20]. A related construct to residential satisfaction is sense of community consisting of a shared confidence that members' needs will be met by the commitment to be together and a feeling that members have of belonging and being important to each other [21].

It would be interesting to expand the role of historic sites and their restorative properties in relation to residential satisfaction and sense of community.

Both natural and historical environments, however, are vulnerable to environmental changes, including pollution, increasing temperature, extreme weather events and seismic and hydrogeological events [22,23]. It was shown that damage to historical or heritage sites can have a discouraging impact on individuals, potentially diminishing their overall well-being [24]. Moreover, environmental stressors exacerbated by concern and anxiety related to climate change [25] can reduce people's residential satisfaction and sense of community [26].

Concerning the relationship between environmental changes and restorativeness, a study has investigated how temperature fluctuations affect the perceived restorativeness of environments. The results suggest that higher ambient temperatures in a park were linked to reduced psychological restorativeness [27]; similarly, another study showed that marine litter can diminish the psychological benefits of coastal environments [28]. While it is well known that environmental changes may influence perceived restorativeness, it remains uncertain whether the mere risk perception of such events—and the related emotions—is connected to restorativeness, residential satisfaction, sense of community, and well-being in urban settings.

This study aims to explore the interplay between the perceived risk of adverse environmental events, the emotions associated with the potential loss of historically and culturally

significant places, and their impact on inhabitants' well-being, residential satisfaction, and sense of community in a historical city in Northeastern Italy. The study of these subjective aspects aims to better understand how to enhance the long-term sustainability of the city. Specifically, it was hypothesized that not only restorativeness, but also the perceptions of risk of environmental events and the emotions that would be felt in the loss of places with value can have a role in explaining residential satisfaction, sense of community, and well-being of the residents of Piazzola sul Brenta.

The present study is part of the iNEST project and Spoke 4 on City, Architecture, and Sustainable Design financially supported in the frame of the PNRR Program (the Italian National Recovery and Resilience Plan). Specifically, the study focuses on Piazzola sul Brenta, a small town in the Veneto region characterized by its valuable architecture, including Villa Contarini, around which the village historically revolves, and by green and blue spaces integrated with the built ones. All of these aspects are taken into consideration and explored as restorative elements. The choice of this town was supported by an in-depth historical and architectural analysis of the area, including an overlay of cartographic maps that demonstrated how the current urban layout has been shaped by the positioning of the Villa and the park [29]. The findings by Montanari and colleagues (2023) [29] indicate that the town's historical features (Villa Contarini) and natural elements (the Villa's parks) are key factors that have influenced the urban structure that leans on the grid created by the orientation of the Villa. In other words, the urban layout of the small city has detached itself from the Roman axes and leans, instead, on the grid created by the orientation of the Villa. The previous study on Piazzola sul Brenta, therefore, showed that Villa Contarini was purpose-built as a landmark center at the time, and we wonder here whether it is still a contemporary reference point for the inhabitants now. Villa Contarini and its park are integral to the cultural and architectural heritage of the town and its residents, embodying an intrinsic value that is recognized and cherished [30]. See Figure 1 for a photo of Villa Contarini.



Figure 1. Photo of Villa Contarini (Piazzola sul Brenta, Padua, Italy).

In the present study, we aim to investigate whether the inhabitants still attribute historical and economic value to it and, if so, how much damage to it would affect them. For this purpose, we asked the inhabitants of Piazzola to indicate the main buildings or natural places with historical and economic value and then indicate how they would feel in case of damage due to environmental hazards. Moreover, we investigate whether and how the perceived risk and the associated emotions about the possibility of damage are related to the inhabitants' well-being, residential satisfaction, and sense of community. We expected that both the perceived risk and the emotions felt at the idea of damage to places of historical value could be associated with the inhabitants' well-being and satisfaction.

2. Materials and Methods

General residential satisfaction [31,32] consists of three questions assessing inhabitants' general residential satisfaction on a 7-point Likert scale (from 1 = not at all to 7 = completely).

Items: “Overall, how satisfied do you feel with living in this city”; “Would you recommend this city to friends or acquaintances who are looking for housing?”; and “Do you plan to continue living in this city for a long time?”.

The Warwick–Edinburgh Mental Well-being Scale (WEMWBS) [19,33] consists of 12 items on a 5-point scale (from 1 = strongly disagree to 5 = strongly agree), assessing the mental well-being of respondents when thinking about the last two weeks. An example of the items is “I’ve been dealing with problems well”.

The Multidimensional Territorial Sense of Community Scale (MTSCS) [34] consists of 19 items on a 5-point Likert scale (from 1 = strongly disagree to 5 = strongly agree) used to measure the territorial sense of community and sense of belonging. An example of the items is “I feel I belong to the city community”.

The Perceived Restorativeness Scale—Brief Version (PRS-11) [35] consists of 11 items rated on a 10-point Likert scale (from 0 = not at all to 10 = very much) used to assess the restorativeness of a place (in this case Piazzola sul Brenta) based on its beneficial properties. It measures four factors: fascination, being away, coherence, and scope. An example of the items is “Places like this are a refuge from daily worries.” Participants rate their agreement with each statement based on their experiences.

Perceived risk of environmental events in the city and emotions about the possibility of losing important buildings and places for their historical/cultural and economic value.

Perceived risk. Each participant was presented with a list of four plausible catastrophic events in the area (i.e., earthquake, flood, landslide, and storm) and asked to rate their probability of occurrence, thus putting people’s and buildings’ safety at risk, on a 4-point Likert scale (from 1 = not at all to 4 = very likely).

Emotions. Two items asked participants to indicate the three buildings and/or places that they consider particularly important because of their (1) historical/cultural and (2) economic value, and that should absolutely be protected and safeguarded. Then, in two subsequent items, the participants were asked to imagine the intensity of emotions felt in the event of damage to the places described above and the city in general on a 9-point Likert scale (from 1 = very happy to 9 = very sad).

2.1. Procedure

The study was conducted entirely online using Qualtrics (<https://www.qualtrics.com>, accessed on 28 November 2024). First, the participants read and completed the informed consent and then the demographic questions. Then, they filled out the PRS-11, WEMWBS, and MTSCS in a randomized order. Finally, the participants completed the ad hoc questions of the perceived risk of environmental events and emotions about the possibility of losing buildings and places for their historical/cultural and economic value at the end.

2.2. Participants

A total sample of 211 residents in Piazzola sul Brenta (112 women), between the ages of 18 and 77 (mean age = 40.66, SD = 15.05), took part in the study. The participants were recruited either through the personal networks of the experimenters or via outreach on social media platforms. The Ethical Committee for Psychological Research at the University of Padova approved the study (N° 215-a). All participants were informed about the study’s purpose before it was conducted and gave their informed consent in accordance with the Declaration of Helsinki. The present study is part of a bigger project, and the present sample corresponds to part of another study within the iNEST project (see [36]). The sample size was based on a power analysis showing that 200 participants were sufficient to detect a small effect size ($r = 0.20$), at a significance criterion of $\alpha = 0.05$ with 80% power.

2.3. Statistical Analysis

All analyses were performed using RStudio version 2022.07.1+554. Correlation and linear regression models were chosen to investigate in depth the relationships between the variables of interest (Tables 1 and 2). To better understand the directions of participants’

responses, first, we calculated the percentage of times that specific places (historical and natural) were mentioned in both the historical and economic value questions. Then, correlational analysis was run. To further investigate the relationship between variables, we ran three linear models to analyze the relationship among (1) perceived restorativeness, (2) the perceived risk, (3) the emotional impact of damage to economic and historical places (predictors), and the three outcomes well-being, residential satisfaction, and sense of community (dependent variables). In the linear models, we use a step approach, including each predictor one at a time. The predictor added was maintained in the subsequent model only if it lowered the AIC (Akaike Information Criterion) and BIC (Bayesian Information Criterion) by at least 2 units [37]; otherwise, it was discarded. Table 2 shows the model selection of the predictors process for each dependent variable.

Table 1. Means and standard deviations and correlation analysis results.

	M	SD	(1)	(2)	(3)	(4)	(5)	(6)
1. Residential satisfaction	17.07	4.94	-					
2. Mental well-being	43.86	7.19	0.317 ***	-				
3. Sense of community	67.07	14.28	0.637 ***	0.276 ***	-			
4. Restorativeness	63.78	19.55	0.574 ***	0.381 ***	0.611 ***	-		
5. Perceived risk of events	9.13	1.73	-0.174 *	-0.157 *	-0.105	-0.182 **	-	
6. Emotion_Historical value	8.15	1.64	0.110	0.059	-0.012	0.098	-0.053	-
7. Emotion_Economic value	7.48	1.64	0.291 ***	0.018	0.232 ***	0.191 **	0.035	0.358 ***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 2. AIC and BIC value of linear models.

Predictors	Mental Well-Being		Residential Satisfaction		Sense of Community	
	AIC	BIC	AIC	BIC	AIC	BIC
+Restorativeness	1448.548	1458.603	1189.849	1199.904	1628.31	1638.366
+Perceived risk	1450.406	1463.814	1190.727	1204.134	1628.888	1642.296
+Emotions of damage	1428.424	1441.774	1167.91	1181.26	1599.832	1613.182

3. Results

3.1. Percentage of Places with Historical and Economic Value

In the present sample, 95% of the total participants identified Villa Contarini as a historical place. Moreover, 60% of the participants attributed economic value to the Villa Contarini. Additionally, around 40% of the participants indicated the square and the porches as both historical and economically valuable. Finally, 15% of the participants identified the park as an element with both historical and economic value.

The following figures represent the percentages of places listed with historical and economic value out of the total of all places reported by participants (see Figures 2 and 3).

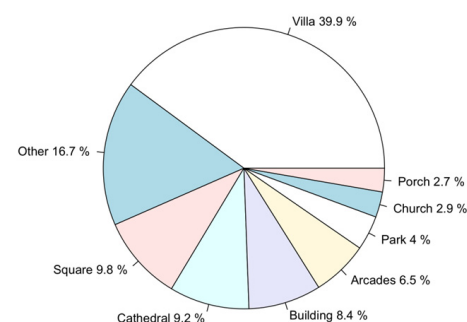


Figure 2. Percentages of places indicated with historical value.

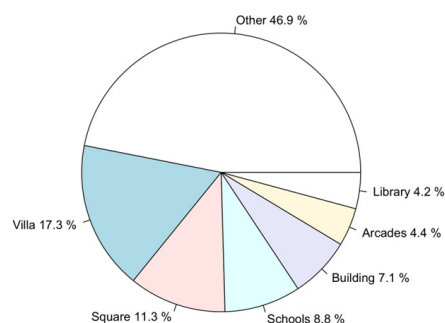


Figure 3. Percentages of places indicated with economic value.

3.2. Correlational Analysis

The results of correlations indicate that restorativeness is positively associated with mental well-being, residential satisfaction, and sense of community, suggesting that a higher perceived restorativeness of living in Piazzola sul Brenta is linked to greater well-being and satisfaction with the city. Additionally, restorativeness is positively associated with the emotions evoked by the possibility of damage, indicating that greater restorativeness is related to emotional responses to potential harm.

Furthermore, restorativeness is negatively associated with the perceived risk of environmental events, suggesting that individuals who perceive their environment as more restorative also perceive lower risks from environmental factors. Similarly, perceived risk is negatively associated with both mental well-being and residential satisfaction, implying that higher well-being and satisfaction with living in Piazzola sul Brenta correspond to a reduced perception of environmental risks.

Finally, the emotions related to potential damage to places with economic value are positively associated with residential satisfaction and sense of community. This suggests that greater satisfaction with living in the community of Piazzola sul Brenta corresponds to stronger negative emotions when imagining potential damage to its economically valuable places (see Table 1).

3.3. Linear Models

Mental well-being. Regarding the linear models on mental well-being, the predictors included were restorativeness and emotional impact of damage of both historical places. The results showed a significant positive relation between mental well-being and restorativeness ($\beta = 0.17$, 95% CI [0.12, 0.22]; $p < 0.001$) while a non-significant relationship emerged between emotions felt and mental well-being ($\beta = -0.03$, 95% CI [-0.41, 0.34]; $p = 0.84$).

Residential satisfaction. Regarding the linear models on mental well-being, the predictors included were restorativeness and emotional impact of damage of both historical and economic places. The results showed a significant positive relation between restorativeness and residential satisfaction ($\beta = 0.14$, 95% CI [0.11, 0.17]; $p < 0.001$), and a significant positive relation between emotional impact of damage ($\beta = 0.26$, 95% CI [0.06, 0.46]; $p = 0.01$).

Sense of community. Regarding the linear models on mental well-being, the predictors included were restorativeness and the emotional impact of damage to both historical and economic places. The results showed a significant positive relation between restorativeness and sense of community ($\beta = 0.45$, 95% CI [0.36, 0.53]; $p < 0.001$) and a non-significant positive relation between emotional impact of damage and sense of community ($\beta = 0.14$, 95% CI [-0.43, 0.71]; $p = 0.62$).

4. Discussion

Exposure to historical and natural environments has been shown to have positive effects on people [13,38]. However, less is known about the well-being and satisfaction that come from living in real places and cities that have such historical and natural characteristics.

The present study, therefore, focuses on Piazzola sul Brenta, a town in the Veneto region, which is an example of a historical environment with the presence of marked green elements. In addition, Piazzola sul Brenta was chosen because a previous study by Montanari et al. (2023) [29] showed how the historic Villa has influenced the actual construction and urban network of the town by highlighting it has, from an urban and environmental perspective, been a landmark for the town and its street grids.

With the present study, we investigated whether, nowadays, there still exists the historical and economic value recognized by the inhabitants and the perceived possibility of it suffering damage due to environmental changes and events. In addition, we investigated perceptions of restorativeness and well-being, residential satisfaction, and sense of community.

Building on this, our aim was to examine the relationship between the perceived risk of environmental events and the emotional impact of historical and economic damage to significant city landmarks, in relation to restorativeness, residential satisfaction, sense of community, and the well-being of the inhabitants of Piazzola sul Brenta. In other words, we investigated whether a historic city offers opportunities for well-being through the value and emotions attributed to place and perceived environmental restorativeness.

Concerning the results, analysis of the averages and frequencies indicates that residents of Piazzola sul Brenta exhibit high levels of residential satisfaction, psychological well-being, and sense of community (see also Supplemental Material). This might suggest that living in a place that is historic and rich in natural elements might improve the well-being and satisfaction of those who live there. However, it should be mentioned that several non-environmental factors may also contribute to these aspects, such as age, socioeconomic status, and physical health [36].

Among the three physical places in Piazzola sul Brenta that residents associated with historical and economic significance, as expected, a wide majority (95%) recognized Villa Contarini for its historical value. Additionally, a significant portion of residents (60%) attributed economic value to the Villa, highlighting its considerable importance within the contemporary community. It is also interesting to note that around 15% of the participants recognized a historical and economic value to the park, suggesting that although in much smaller numbers, people recognize its value and importance for the community. Moreover, the mean levels of negative emotions at the idea of losing historical places of Piazzola sul Brenta are also very high ($M = 8.15$; $SD = 1.64$), showing how all residents would be very affected by the possibility of damage to Villa Contarini.

With regard to the relationships between the variables, this study corroborates previous findings that identify a connection between historical heritage and well-being [16]. Specifically, our results extend existing knowledge by highlighting a relationship between the perceived risk of environmental events and the subjective experience of well-being.

First, our results confirmed previous findings on the positive effect of restorativeness on well-being [38]. Specifically, we found that a higher perceived restorativeness of living in Piazzola sul Brenta is associated with greater well-being, increased satisfaction with the city, and higher negative emotions evoked by the possibility of damage. These findings contribute to the literature by newly highlighting the link between restorativeness and emotions related to potential damage from environmental or climatic events, suggesting that a higher perception of restorativeness may intensify emotional responses in the event of damage.

In contrast, restorativeness is negatively associated with the perceived risk of environmental events, which is also negatively related to mental well-being and residential satisfaction. This suggests that higher well-being and satisfaction with living in Piazzola sul Brenta correspond to a reduced perception of environmental risks. These findings are interesting, as they may imply that restorativeness could have a sort of protective outcome in reducing the perception of risk but on the contrary is associated with the increase in emotions experienced in the event of damage.

Finally, the correlations with emotions related to potential damage to places suggest that greater satisfaction with living in the community of Piazzola sul Brenta is associated with stronger negative emotions when imagining potential damage to its economically significant places.

From the results, however, no relationship has emerged between the perceived emotions of damage of historic places with the dependent variables of residential satisfaction, well-being, and sense of community. One possible explanation for the lack of correlation could be that a very high percentage (almost all of the sample) indicated the Villa as a place of historical importance and reported very high scores of negative emotions at the idea of damage to such a place, leading to a ceiling effect in the scores.

Overall, the results from the correlations suggest that individuals' awareness of environmental risks to historical places, but especially the emotions felt based on such risks, may play a critical role in their overall sense of well-being. These results show, for the first time to our knowledge, that there is also an emotional component related to environmental risk, which is associated with mental well-being and residential aspects in the Northeast of Italy.

Finally, the results from the linear models further indicate that restorativeness is a significant predictor for all measures of well-being and satisfaction with the city and community, reinforcing the benefits of restorativeness. However, emotion related to potential damage to significant historical and economic places emerged as a significant predictor of residential satisfaction, highlighting how emotional factors can positively influence satisfaction with the city. Finally, perceived risk did not emerge as an important predictor of well-being or satisfaction.

5. Conclusions

In conclusion, this study sheds light on the historical and economic significance of Piazzola sul Brenta from a psychological perspective. It highlights how the restorative qualities of the town's places and buildings, along with the emotions tied to its historical and economic heritage, influence not only individual well-being but also the overall sense of belonging within the community.

This study extends previous findings on historical places investigated with brief expositions [16] also on the general perception of living in a place with historical and natural elements suggesting that the emotion felt at the possibility of losing important places and restorativeness can have a role in explaining resident's well-being.

The findings emphasize the psychological benefits derived from historical and restorative environments, underlining the need to integrate well-being evaluations into heritage preservation strategies and sustainable design. Recognizing the interplay between restorative spaces, well-being and historical sites can guide sustainable development practices that balance modernization with historical conservation. Incorporating restorative principles into urban design and developing policies to manage and mitigate the risks of environmental events that could compromise historical sites may strengthen a sense of well-being and satisfaction. To conclude, further interdisciplinary studies should further explore the links between heritage, restorativeness, and well-being to inform heritage and urban sustainable policies.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su162411129/s1>, Figure S1: Descriptive statistics with histograms.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data are available on request.

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