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Tolerance to Urban Window Views with Various Design Features

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Abstract: Urbanisation and densification of the built environment is an important feature of the future sustainable environment, which importantly influences the window view quality. This survey addresses a research gap on unfavourable reactions to window views in dense urban environments, where the distance between buildings enables only the view of the neighbouring façade, and also the question of which architectural visual elements specifically trigger them. The typical variables of the studied window views are the various degrees of maintenance, compositional quality, surface quality, activity dynamics, and complexity. The quantitative data, such as general reactions of the observers to window views, the reasons for the reactions, and the assessment of specific features, were collected by means of a close-ended questionnaire. The targeted population was predominantly the work-active population, the population performing sedentary/office work for at least part of the working day. The analyses of the results are predominantly performed using descriptive statistics and encompass overall reactions to similar window views and correlations between gender, age, and window view preferences. An important finding is that gender and the way the respondents spend their workday do not significantly affect the response to the motifs of the window view. The research further shows that it is very difficult to incite and retain enough visual interest to specific window views with standard architectural approaches and subdued architectural design.

Keywords: daylight; window view; urban density; descriptive statistics

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1. Introduction

A window view is one of the most important, although somewhat neglected influential feature of the internal environment. Among the important effects, a favourable window view diminishes stress and mental fatigue [1–3] which supports psychological well-being [1,4–6] and enhances the mental functions like memory, speech, and movement coordination [7]. A window view also has an intimate aspect. It affords the observer personal space and at the same time connects her/him with the surroundings. Several authors suggest that a pleasing window view positively affects the value of the property [8–10], while a low-quality window view significantly decreases it [11].

A review of regulations in the field of daylighting shows that the requirements are mostly quite general and fragmented; for example, they specify the size of window openings in relation to the floor area, but they do not cover all influential factors such as the orientation of daylight openings and window views.

The standard [12], which was adopted a few years ago, somewhat improves this situation, as it covers both quantitative aspects, for instance, the average daylight factor

and insolation, but also qualitative aspects, like glare and the window view. While the first three parameters are commonly used in practice, the latter is relatively new. Although the number of studies on the topic of window views has been increasing recently, the total number is still quite limited. Compared to other areas of daylighting, they mainly focus on the window view in public spaces [13]. The findings indicate that the view of the surroundings triggers diverse reactions in a person—these mainly depend on the contents of the view [14,15]. For example, in the work environment, a visible contact with nature improves general life and work satisfaction [16–21]. Furthermore, when employees have a choice, they will opt for an office with a window rather than one without it [22,23]. Studies also suggest that window size and viewing distance are important predictors of window view satisfaction in work environments [24], and dynamic views with a lot of movement are distracting for office workers [25]. Likewise, in a restaurant, the tables by the window fill up first, and the price of renting a hotel room depends on the window view [26].

Window views also affect the well-being and learning performance of children in schools [27–29]. Zbašnik-Senegačnik et al. [30] note that most students wish to sit by the window because the view relaxes them. In an experiment, Li and Sullivan [3] found that students who had observed greenery through the window during the break achieved significantly higher results in tests of directed attention after the break and recovered faster from a stressful situation than their peers who had spent the break in classrooms without a view of green areas. Also, in the hospital environment, studies have detected a connection between patient comfort, length of hospital stay, and cognitive performance in relation to the window view [31,32].

In urban studies, a quality window view is often associated with a certain proportion of greenery in the surroundings, which enhances its aesthetics [33,34] and encourages people to spend more of their time outdoors [35]. The contact with green public spaces, thus, enables better opportunities for social interaction, which translates into better health indices [35–37], and reduces income-related health inequalities but can also positively influence lifestyles. This is especially important in an older, physically less active population, as it promotes active ageing [38,39]. In contrast, window views of urban areas, commercial landscapes, and industrial zones increase feelings of sadness and decrease attention [40,41]. Laumann et al. [42] further observes that a window view of the urban environment, such as a pedestrian street or heavy traffic, caused a group of observers to have a higher heart rate than a group observing a natural environment.

Description of the Objectives and Research Questions

The influx of people into cities accelerates urbanisation and the densification of the urban space. Urban densification is a concept whose basic starting point is the efficient use of land, which greatly reduces the distances between buildings. The settlement of large numbers of people often results in the construction of tall buildings. With small gaps between buildings, the view through the window is limited to only a middle visible layer. The bottom layers with vegetation and people are visually inaccessible, while the upper layer provides a view of the sky and the distance and monitoring of important information about the weather and time of day [25,43]. Interaction with the external environment is limited to the nearby facade opposite the window. Given that the urban environments have a long lifespan, their influence on psychological well-being should not be neglected [44].

The study by [45] furthermore suggests the relationship between the proximity of the elements in the window view and psychological responses, as well as between the type of window view and physiological responses. Some authors imply, however, that the factors affecting the attractiveness of the view have not been completely characterised yet, and insufficient information about the view preference is available; they stress the need to

quantify view quality in order to develop reference data [46]. Lately some authors have introduced the categorisation of high-rise window views, which includes greenery, blue, and urban environments, advancing beyond the binary framework of greenery versus urban environments [47]. Still, very few have researched in detail unfavourable reactions to window views and clarified which architectural elements specifically trigger them. This creates an important research gap, which this study intends to address.

Drobne et al. [15] believe that the density and quality of the urban space, which also includes the attitude towards the window view, mainly depend on the user's perception of the space and its dimensions. The closer the opposite façade, the less interaction with the wider environment, and consequently, less information is provided to the observer. For example, Pallasmaa [48] discusses the influence of planimetry, the plasticity of architecture, and the importance of peripheral vision for perceiving the depth of space. The closer the building is to the observer, the less readable the tectonic structure of the building is, and details, such as the composition of façade elements and maintenance, become more important [49]. This brings forward the influence of architectural features in the motif of the window view, especially in densely built urban environments. The quality of the window view and thus the visual comfort in this case are defined by the constructive and decorative elements on the façade; the position in the composition; the variety of colours, textures, shapes, and motifs; the balance between them, namely contrasts and harmony; and the maintenance and age of the buildings, are factors that artistically connect the building as a whole [33,44]. Kent and Sciavon [50] find that a diverse and dynamic motif is more interesting than a monotonous one, and the complexity and readability of the composition increase the observers' attention [51]. Also, some researchers suggest that urban façade colour schemes with light and warm tones are more tolerable [52]. The age of buildings and their maintenance also have a decisive influence on the perception of the urban environment [15,53].

The main objectives of this study are to determine which features of window views influence the response, how individual groups respond to the views (i.e., according to age, gender, and workplace), and whether any of the groups is more tolerant of unfavourable window views. The research is based on previous findings which imply that negative reactions of users are particularly pronounced in densely built environments. Above all, it is oriented towards the reactions to the window views which comprise exclusively urban elements and a middle visible layer without the sky and the ground [3,40]. The studied factors include various architectural features like plasticity, composition, maintenance, and other similar features.

The main research questions are as follows:

- Do age and gender influence the choice of the preferred window view?
- What influences the level of disagreement to unfavourable window views?
- Is the level of tolerance to urban window views linked to personal characteristics?

A questionnaire is used to obtain the general reactions of the observers, the reasons for the reactions, and their agreement with specific features. With the analysis based on descriptive statistics, we expect to be able to determine the overall reactions to similar window views and correlations between gender, age, and window view preferences. The consistent use of the Chi-Square test across different hypotheses ensures methodological coherence in handling categorical data throughout the study.

2. Methodology

2.1. Survey Methodology and Questionnaire Setup

A close-ended online questionnaire was used to collect the quantitative and qualitative data. The questionnaire survey was voluntary and anonymous. The methodology

consists of a two-phase approach to questioning (Figure 1). The first phase of the questionnaire includes the gathering of demographic data, such as questions related to the respondents' perception of themselves and their preferences. The following characteristics and preferences were taken into account:

(a) Gender.
(b) Age group.
(c) I see myself as
    - A lively person who appreciates good company and fun.
    - A calm person who appreciates privacy and peace.
(d) My favourite window view mainly contains
    - Greenery (trees, bushes, grassy areas, and flowers).
    - The urban built environment (buildings nearby, streets, squares, and people's activities).
    - Water motive (rivers, lakes, and the sea).
    - Landscapes (mountains, hills, houses, and roads in the distance).
    - The suburban environment (scattered buildings and smaller buildings in the greenery).
(e) For me, the most important reason for looking out the window is
    - To monitor the weather or the passage of time.
    - To look into the distance for a short mental break.
    - To look at the nearby environment or monitor changes in the environment.
    - To observe external events (the arrival of visitors, the presence of neighbours, passers-by, children playing, etc.).

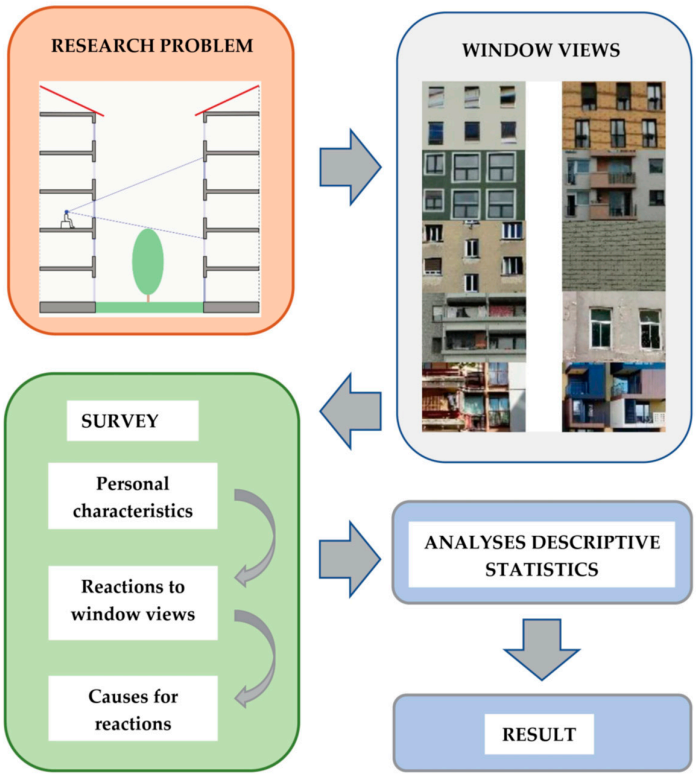

Figure 1. The conceptual framework of the research work.

The second phase consists of reactions to ten specific window views. The participants were first asked to select a reaction to an individual window view (positive, negative, and

neutral). Following the selected reaction, they were further asked to select sub-answers linked to the causes for their reaction. They were able to choose between A: the materials used and the colouring of the façade surface are attractive, B: the façade design is harmonious, C: I like a variety of forms and the quantity of details, and D: I like to observe activities on a building across. Responses were collected using a four-point Likert scale (1—do not agree, 2—somewhat not agree, 3—somewhat agree, and 4—agree).

2.2. Façade Motives

This study addressed the window views of multistorey buildings in residential neighbourhoods above the tree canopy, therefore not encompassing any greenery. As examples of such window views, a set of realistic motifs was collected, exemplifying the window view of the 3rd and 4th floors. In order to capture the common urban scenarios and the most realistic window views possible, residential buildings in various neighbourhoods in Ljubljana, Slovenia, were photographed. Window views were collected based on design and compositional suitability for this study, and we did not take into account, for example, the quality of the architecture and similar attributes. The emphasis was, for instance, on varying wall and window ratios [54] and, in accordance with the compositional elements presented in Ching et al. [44], for colour (e.g., window view numbers 3, 9, and 10), texture (window view number 6), contrast and variety (window view numbers 4, 7, 9, and 10), harmony (window view number 1, 2, and 5), maintenance (window view number 8), and inexpressiveness (window view number 6). To avoid the influence of the surroundings and the weather on the responses, all the buildings were photographed frontally, from the same distance and in the same weather conditions. At the same time elements that might influence the responses of the questionees like greenery and social or urban scenes were omitted. The final ten selected motifs include a representative range of diversely designed and maintained building façades, which characterise various environments and cover a range of window view qualities that were addressed in this study (i.e., various compositional approaches, plasticity, window size, surface texture, age, and the maintenance of the viewed facades) [44].

2.3. Targeted Population

The targeted population was the work-active population, the population performing predominantly sedentary work during a portion of the working day. We assumed that the sedentary working population was more affected because workers are tied to their workplace and the same window view for a long time during the day. In addition, the study goal was to include the population that works in different locations or partly from home, which, after the COVID 19 pandemic, has become a feature of many sedentary jobs [55]. It was expected that varying work environments during the day might affect the response to window views.

The snowball sampling method was used to reach the chosen population. A link to the online survey tool 1KA [56] was sent to contacts with Slovenian addresses in the New University's e-mail repository. The contacts were asked to forward the questionnaire link to their further contacts. The selection of further participants was left to the initial links; nonetheless, they were likely to share similar professional networks and potentially similar workplace environments as the general public. This ensured access to a sufficient number of respondents who perform sedentary work and work in an office or from home at least for some of the workday. On the other hand, this approach limited the recruitment of other parts of the working population. Thus, the sample may not accurately represent the broader population of workers.

The use of an online questionnaire ensured an anonymous, wide-spread, and efficient data collection process within the specific timeframe. Given that the survey was distributed via contacts within the New University, a specific check for representativeness was not carried out. The use of snowball sampling through the New University contacts facilitated rapid data collection but also introduced potential biases inherent to this method. This limitation may somewhat hinder the generalisation of the results to a broader population in terms of age and workplace, but, on the other hand, it provides an insight into the specific portion of the working population that is performing predominantly sedentary work and is in part working in various locations, for instance from home. Thus, the survey results should be understood in the framework of this sampling method. To enhance validity, future studies should employ more diverse and probabilistic sampling methods to ensure broader applicability of the results.

2.4. Analysis

Descriptive statistics and the Chi-Square test were chosen to establish a foundational understanding of the basic patterns and distributions within our data. This aligns well with the exploratory nature of the research questions. Alternative methods like regression analysis were considered less appropriate due to the categorical nature of both the independent and dependent variables.

In the first step, an examination of the respondents' favourite window view and the main reasons for looking through the window were analysed using descriptive statistics. Descriptive statistics were used to provide a clear and straightforward summary of the respondents' preferences and behaviours, which was crucial for the initial understanding of the data. This approach efficiently summarised the basic distribution of the data, providing initial insights into the reactions to window views (Q1) and enabled the identification of patterns for further analysis. In the second step, the Chi-Square test was used to analyse associations between two categorical variables. Specifically, it assessed whether age and gender influence the favourite window view (H1) and whether age and gender influence the reason for looking through the window. This approach was found particularly appropriate for the analysis because it enabled the determination of associations between the categorical variables without assuming any underlying data distribution.

The reactions to window views (Q2) were analysed using the collected quantitative data. The variances between the reactions and the reasons were analysed on the basis of the answers' frequency and the selected responses. The dispersion of the responses was assessed using the coefficient of variation, which is the standard deviation of the responses normalised by the mean of the responses. Furthermore, the Chi-Square test was used to analyse the relationship between the categorical variables. In the final stage, potential interdependency between a specific window view, age, and gender was tested (Q3), again using the Chi-Square test.

3. Results

3.1. General Respondents' Preferences

The quantitative data were collected through the online survey tool in May 2023. This action resulted in a total of 112 fully completed questionnaires, of which 38% participants were male and 62% were female. The participants belong to four main age groups, which can be paired with the key life periods; students up to 20 years represented 15%, the young working population (21 to 40 years) encompassed 27%; the mature working population (41 to 60 years) was the largest age group at 38%, and seniors (above 60 years) were represented at 20%. Given the age structure, the majority of the participants belong to the working population (71%), and the smaller shares are the students (23%) or retirees (6%).

The survey further revealed that half of the respondents (50%) work in various locations during the day; a total of 34% mostly spend their day in the office, and 16% predominantly work from home. Such a structure was expected, since many university staff members like teachers, administration workers, and others were involved. According to the results, the basic goal regarding the age structure, the type of employment, and the work environment of the targeted population was achieved.

In the first part of the questionnaire, the questions were focused on the preferred motifs of window views. As expected, the results show that respondents do not consider all window views equally attractive. Specifically, respondents predominantly chose greenery in the view as the most desirable feature (47%), followed by water motifs, a view of the landscape and the built environment with 15–16% shares. Respondents least often chose the suburban environment as the most desirable feature in their window view (6%) (Table 1).

Table 1. The chi-Square test for the association between the categorical variables "gender" and "the favourite window view".

Gender		Respondents' Favourite Window View						χ^2
		Greenery	Built Environment	Water Features	Landscape	Suburban Environment	Total	
Male	f	35	6	13	12	3	69	6.81
	%f	31%	5%	12%	11%	3%	62%	
Female	f	18	11	5	6	3	43	
	%f	16%	10%	4%	5%	3%	38%	
TOTAL	f	53	17	18	18	6	112	
	%f	47%	15%	16%	16%	6%	100%	

In the next step, interdependencies between variables were determined, specifically whether there was a statistically significant connection between the demographic data of respondents and other results. For this purpose, the gender and age of the respondents were compared with the preferred window view and the main reason for looking out of the window. The Chi-Square test was used to calculate whether there is a statistically significant association between the categorical variables. The Chi-Square statistic and a *p*-value were compared with the selected significance level of $\alpha = 0.05$.

Firstly, the Chi-Square test was used to estimate a statistically significant association between the categorical variable "the preferred window view" and the independent categorical variable "gender". As seen in Table 1 above, the calculated Chi-Square statistic is 6.81, with a *p*-value of 0.15. Given that the *p*-value is more than the significance level of $\alpha = 0.05$, gender does not have a significant impact on individuals' favourite window view.

In previous work, it was already established that the age of the respondents influences their preferred window view [13]. Again, the Chi-Square test was used to assess a statistically significant association between the categorical variable "the preferred window view" and the independent categorical variable "age group" (Table 2). The calculated Chi-Square statistic was 28.90, with a *p*-value of 0.004. Given that the *p*-value was less than the significance level of $\alpha = 0.05$, the results indicated that age influences individuals' favourite window view. This is a significant information, since belonging to the age group is an important demographic category. The results indicate that the middle age groups (i.e., working population) prefer views of greenery, water features, and landscapes, i.e., a view of a peaceful and relaxing natural environment without much movement. Greenery as a motif was chosen by approximately half of the respondents in both middle age groups. Also, compared to other age groups, the age group above 60 years was significantly less tolerant of the built environment's views (4%) than other age groups and largely preferred greenery

(64%). On the contrary, the age group up to 20 years was considerably more tolerant of the built environment's views to the degree that for this group, the built environment was the most attractive of all the proposed motifs (50%), while greenery as a preferred motive was much less represented compared to the rest of the age groups (22%). It is also noteworthy that the view of the suburban environment was not a common choice and was represented by only a few percent in practically all age groups.

Table 2. The chi-Square test for the association between the categorical variables "age group" and "the favourite window view" [13].

Age Group		Respondents' Favourite Window View					Total	χ^2
		Greenery	Built Environment	Water Features	Landscape	Suburban Environment		
Up to 20	f	4	9	3	2	0	18	28.90
	%f	22%	50%	17%	11%	0%	100%	
21–40	f	15	2	7	5	1	30	
	%f	50%	7%	23%	17%	3%	100%	
41–60	f	20	5	6	9	2	42	
	%f	48%	12%	14%	21%	5%	100%	
Above 60	f	14	1	2	2	3	22	
	%f	64%	4%	9%	9%	14%	100%	
TOTAL	f	53	17	18	18	6	112	
	%f	47%	15%	16%	16%	5%	100%	

The vast majority (55%) of respondents chose "mental disconnection" as the main reason for looking through the window, followed by "changing environment" (24%) and "external events" (16%), which were much less represented. Interestingly, only 9% of respondents indicated that following weather changes were the main reason for observing the exterior (Table 3).

Table 3. The chi-Square test for the association between the categorical variables "gender" and "the reason for looking through the window" in regard to the main reason for looking through the window.

Gender		Respondents' Main Reason for Looking Through the Window				Total	χ^2
		Changing Weather	Mental Disconnection	Changing Environment	External Events		
Male	f	6	41	17	5	69	3.51
	%f	5%	36%	15%	5%	61%	
Female	f	4	21	10	8	43	
	%f	4%	19%	9%	7%	39%	
TOTAL	f	10	62	27	13	112	
	%f	9%	55%	24%	12%	100%	

In the next step, interdependencies between variables were assessed. Again, a Chi-Square analysis was used, which allowed us to examine the association between the above categorical variables, "gender" and "the reason for looking through the window". The calculated Chi-Square statistic is 3.51, with a *p*-value of 0.48. Given that the *p*-value is more than the significance level of $\alpha = 0.05$, the results imply that gender does not have a significant influence on individuals' main reason for looking through the window (Table 3).

This indicates that the observed differences are likely due to random variation rather than the actual effect of gender.

When analysing the age group and the reasons for looking through the window (Table 4), the answer "mental disconnection" was chosen most often (55%). A closer analysis shows that the work-active age groups of 21–40 years and 41–60 years often chose "mental disconnection" as the main reason for looking through the window than other age groups. The results also imply that there are no significant differences regarding the choice of the answers "changing environment" and "changing weather". The answer "external events" was chosen somewhat more often by the younger age groups. A Chi-Square analysis was again used, which allowed us to examine the association between the above categorical variables, "age" and "the reason for looking through the window" (Table 4). The calculated Chi-Square statistic is 17.13, with a *p*-value of 0.047. Since the *p*-value is less than the significance level of α = 0,05, the calculation confirmed that age has a significant influence on individuals' main reason for looking through the window.

Table 4. The chi-Square test for the association between the above categorical variables, "age" and "the reason for looking through the window".

Age Group		Respondents' Main Reason for Looking Through the Window: Changing Weather	Mental Disconnection	Changing Environment	External Events	Total	χ^2
Up to 20	f	2	5	7	4	18	17.13
	%f	2%	4%	6%	4%	16%	
21–40	f	4	18	3	5	30	
	%f	4%	16%	3%	4%	27%	
41–60	f	3	29	8	2	42	
	%f	2%	26%	8%	2%	38%	
Above 60	f	1	10	9	2	22	
	%f	1%	9%	7%	2%	19%	
TOTAL	f	10	62	27	13	112	
	%f	9%	55%	24%	12%	100%	

3.2. Reactions to Specific Window Views

In the second part of the survey, a representative sample of multistorey buildings in residential neighbourhoods was observed in the window view. The reactions of the respondents to specific façade features, like surface properties, such as colour and texture, compositional quality, the variety of forms and details, and the possibility of observing activities, were closely monitored. Table 5 presents window view cases with a share of the prevailing reactions, mean values, and standard deviations.

The survey results show that the respondents reacted fairly negatively to several of the suggested window views. In such cases, the reactions were predominantly uniform (e.g., see window view numbers 5, 7, 8, and 9). Only two out of the ten suggested window views received a predominantly positive response (i.e., window view number 2 and 10), but none of them achieved a high level of agreement. Such results were expected since the survey included principally unfavourable window views of a densely built urban environment. Respondents named various façade features as the cause of their reactions. Based on these answers, it can be resolved that visually attractive surface treatments, such as rich textures and vibrant colours, received a far more positive reaction, while the neutral colour scheme of the façades, typical of most buildings in cities, received rather negative or at best neutral reactions from the respondents. Likewise, the dynamism of the composition or other visually interesting features evoked a positive response, but only in cases where the composition was harmonious. The dynamic nature of the composition was also perceived

as positive since it triggered surprise and reduced the sensation of monotony. Given that the respondents' reactions to window views with similar features were consistent, in densely built urban environments with a limited interest in window views, predominantly negative reactions from observers can be expected.

Table 5. Window views and respondents' reactions.

Window view					
No.	1	2	3	4	5
			Reaction to window view (%):		
Pos. (%)	30	52	36	6	1
Neg. (%)	58	15	40	53	70
Neu. (%)	12	33	24	41	9
Mean	1.8	1.8	1.9	2.4	2.1
σ	0.6	0.9	0.8	0.6	0.3
Window view					
No.	6	7	8	9	10
			Reaction to window view (%):		
Pos. (%)	13	3	3	8	64
Neg. (%)	35	75	84	72	12
Neu. (%)	34	22	14	19	24
Mean	2.3	2.2	2.1	2.1	1.6
σ	0.7	0.5	0.4	0.5	0.8

In the next step, interdependencies between variables were determined. Above all, the influence of demographic data on the reaction to the window view was studied. For this purpose, the gender and age of the respondents were compared with the reaction to a specific window view. The Chi-Square test was used to calculate whether there is a statistically significant association between the categorical variable "response to the window view" and the independent categorical variables "gender" and "age group". The Chi-Square statistic and a *p*-value were compared with the selected significance level of $\alpha = 0.05$.

The correlation test was performed on the example of window view number 3 (Table 6). This window view was the sole one that received a similar share of positive (36%) and negative (40%) reactions and was thus regarded as the most suitable for further analysis. Table 6 is divided into two sections, which reveal the stimulus (reaction to window view) and the predominant reasons for the selected reactions in the form of agree/disagree questions on a Likert scale with a range of 1–4 (1 = not agree, 2 = somewhat not agree, 3 = somewhat agree, and 4 = agree). The causes for reasons refer to various visual stimuli, like composition quality, the variety of details, the surface treatment, and activities.

The results showed that the respondents did not predominantly chose any of the statements. The largest share somewhat agreed or agreed with the cause "used materials and surface colour are attractive" (i.e., 40% of respondents chose the answer 3—somewhat agree, and 23% chose the answer 4—agree). The remaining answers to this statement were distributed fairly evenly, which resulted in a mean value of 2.6. The statements regarding the coherence of the façade, the variety of forms, and the number of details also resulted in a similar distribution of answers (mean values of 2.6 and 2.5, respectively). The question

regarding the monitoring of the activities in the neighbouring building somewhat deviates, as the respondents quite often chose the answer 1—not agree (31%), but the same share of respondents partly agrees, which means that they occasionally like to observe activities and changes in the opposite building (mean value 2.4) (Table 6).

Table 6. Reactions and main reasons for such reactions for window view number 3.

Reaction to window view (%):

Positive:	36
Negative:	40
Neutral:	24

Subquestions	Causes for reactions					Valid	Mean	σ
	1(5)	2(6)	3(7)	4(8)	Sum			
A(1)	23 (21%)	21 (19%)	45 (40%)	23 (21%)	112 (100%)	112	2.6	1.0
B(2)	23 (21%)	24 (21%)	37 (33%)	28 (25%)	112 (100%)	112	2.6	1.1
C(3)	24 (21%)	24 (21%)	43 (38%)	21 (19%)	112 (100%)	112	2.5	1.0
D(4)	35 (31%)	20 (18%)	35 (31%)	22 (20%)	112 (100%)	112	2.4	1.1

(1) A—the materials used and the colouring of the façade surface are attractive. (2) B—the façade design is harmonious. (3) C—I like the variety of forms and the quantity of details. (4) D—I like to observe activities on a building across. (5) 1—do not agree. (6) 2—somewhat not agree. (7) 3—somewhat agree. (8) 4–agree.

In the case of gender correlation, the calculated Chi-Square statistic is 0.64, with a *p*-value of 0.72 (Table 7). Since the *p*-value is more than the significance level of $\alpha = 0.05$, it cannot be confirmed that gender has a significant influence on individuals' response to the selected window view. Similarly to the above results, there is no significant association between gender and the reaction of respondents to the specific window view of the nearby façade (Table 7).

Table 7. The chi-Square test for the association between the categorical variables "gender" and "specific window view" for window view number 3.

Gender		Response to Window View			Total	χ^2
		Positive	Negative	Neutral		
Male	f	26	28	15	69	0.64
	%f	38%	40%	22%	62%	
Female	f	16	15	12	43	
	%f	37%	35%	28%	38%	
TOTAL	f	42	43	27	112	
	%f	38%	38%	24%	100%	

Furthermore, the calculated Chi-Square statistic is 6.22, with a *p*-value of 0.40 (Table 8). Since the *p*-value is higher than the significance level of $\alpha = 0.05$, we cannot confirm that age has a significant influence on individuals' response to window view number 3, as

shown in Table 6. This suggests that the observed differences in responses are likely due to random variation rather than the actual effect of age. However, a more detailed analysis of the results shows that in the age groups over 20 years, the responses are fairly evenly distributed between positive and negative reactions, while in the age group under 20 years, there are much fewer negative than positive reactions. More precisely, the respondents evaluated the window view positively in half of the cases. Additionally, a significant proportion of neutral responses was assigned to this window view. Although the impact of these results is not statistically relevant, the responses of this age group suggest what was already noted above with regard to the preferred window views in the younger population. Namely, the tolerance to urban features in the window view may be higher in the young population and is decreasing by the respondents' age.

Table 8. The chi-Square test for the association between the categorical variables "age" and "specific window view" for window view number 3.

Age Group		Response to the Window View			Total	χ^2
		Positive	Negative	Neutral		
Up to 20	f	9	3	6	18	6.22
	%f	8%	2%	6%	16%	
21–40	f	11	11	8	30	
	%f	10%	10%	7%	27%	
41–60	f	13	21	8	42	
	%f	12%	19%	7%	38%	
Above 60	f	9	8	5	22	
	%f	8%	7%	4%	19%	
TOTAL	f	42	43	27	112	

4. Discussion

The results showed that the most desirable window view by far contains greenery. This is consistent with previous studies on different populations and urban environments, which also found a prevailing preference of respondents for views that contained movement, greenery, and the sky (see [25,34,45,57]).

Our previous research, conducted in primary schools [30], similarly found that the largest share of respondents prefers to observe aquatic features, such as lakes, rivers, and the sea. These are preferred over mountains and woods when it comes to the natural contents of the view. Their share prevails in most schools and does not significantly differ depending on the location of the school. However, this research revealed that respondents largely prefer vegetation over water features. Since we do not have sufficient data on why the school population mostly chose water motifs, we cannot explain this divergence. Nevertheless, the researchers imply that the surveyed population in both cases chose views of a natural environment over suburban and urban motifs.

Additionally, a comparison with previous studies supports the notion that preferences for the window view motives are linked to the activity of the observer. For instance, respondents who were preforming sedentary work during the day mainly preferred window views that relaxed them and offered regeneration (see for example [18]) and were not distracting [25]. In this study, the part of the respondents who did not mainly perform office work preferred a different content of the window view which allows longer observation and monitoring of activities in the environment. The previous studies showed similar results in the school population [30], students, and office workers [14], regardless of whether they worked from home or in the office. This means that we can associate a preference for greenery in the window view with the working population who looks out of

the window during the working day for a short visual relaxation and regeneration, while the less active age groups often require less such breaks. This is also consistent with the research that studied the reaction to window views in healthcare facilities [32]. The results thus imply that it would be prudent to design window views adjusted to population age and activity.

As noted by some researchers [33,45], in the cases when building density limits the distant window view and allows only the observation of the middle visible layer, a significant correlation occurs between the proximity of the window view and the psychological response of the observer. Regarding research question 2, the results confirm this correlation and reveal that the level of disagreement is consistent in the cases where the window view is limited to only one layer. The design quality of the observed façade to a certain degree diminishes negative reactions but cannot entirely compensate for the missing visible layers, distant views, and greenery. This is also in line with [43] and with the assessment system of the SIST EN [12] for the quality of the window view.

The research further suggests that with the classic architectural approaches and subdued architectural language, it is very challenging to rouse enough visual interest in observers. The window views included in this study, which can be defined as interesting or enough to evoke some positive response, all contain rich surface textures and colour schemes.

Based on previous research, it was also hypothesised that gender and age might affect the respondents' preferred window view (research question 1). In our previous research conducted in primary schools [30], the results showed that the majority of the surveyed school population preferred a view of nature, but boys were slightly more tolerant to urban window views than girls. The results of this study show a similar trend; that is, gender does not significantly influence the reaction to window views, but age does. Linked to research question 3, the calculated Chi-Square statistic shows that, in general terms, age influences individuals' response to the window view. For instance, the age group below 20 years is significantly more tolerant to specific urban window views than other age groups. This result implies that the younger age groups may be more tolerant to an urban environment viewed through the windows, and tolerance to urban features in the window view may be decreasing with the respondents' ageing.

Furthermore, observing activities in urban spaces is a very important part of the information in the window view, and it was generally perceived as favourable by the older age group. However, in the more detailed analysis of the specific window views, the respondents were surprisingly withheld toward observing the activities on the opposite building. This could be partly attributed to the context of space and cultural values of the urban population which cherishes privacy and partly to the context of observers' activity [25].

A qualitative approach was used to gain a deeper insight into the problem of window views in densely built environments and also to answer why the participants react as they do. The reactions to window views should be understood in light of the participants' previous experiences, perceptions, and behaviour patterns. It is also worthwhile noting the specifics of the environment in which this study was conducted. Slovenia is one of the less urbanised countries in the EU; therefore, it is essential to take into account that the majority of the surveyed population is exposed to views of the natural environment in their everyday life. This means that questionees' sensitivity to urban views might be higher than in the population living in denser urban environments. The answers obtained are therefore not unambiguous and universal and should be understood in the context of the social environment. The specifics of the study are also the sample of the questionees which may somewhat hinder the generalisation of the results to a broader population. However,

it can be generalised to persons who perform predominantly sedentary work and/or work from home.

The study of window views brings forward the problem of sustainable urban planning and the architectural design of building envelopes. Due to urban densification, many window views are deprived of the distant view, the view of the sky, and the view of the ground, which impoverishes the otherwise positive potential of windows. Sustainable urban planning should take greater account of urban geometry, which refers to the dimensions and spacing of buildings within a city, which would allow for better quality window views. Already in the planning phase, greenery must be included in the urban environment, either in the form of trees and shrubs on the ground between buildings or in the form of greening of facades. New findings on the importance of window views and the guidelines that arise from this impose great responsibility on architects in the design of building facades, not only in the arrangement and positions of windows and the ratios between architectural elements on the facade (e.g., the size and shape of window surfaces, balconies and terraces, and the offsets of facade walls) but also in the selection of materials, colours, and textures and, above all, by integrating greenery into the facade. A dynamic composition and an attractive surface treatment can improve the reaction to the otherwise inadequate window views.

5. Conclusions

In order to protect the natural environment, the sustainability goals support the densification of urban areas. The distances between the buildings are becoming smaller, and the window view is restricted by the surrounding buildings. This evokes various reactions in observers, which in turn affect their well-being and health. The main findings of this study are as follows:

1. Importantly, the study suggests that the way the respondents spend their workday does not significantly affect the reactions to the motif of the window view. This means that in the sedentary working population, the mode and place of work (for example, office work, work from home, or multiple work environments during the day) does not significantly affect the reactions to window views. This also means that respondents who perform their work in different environments during the day are not significantly more tolerant of unfavourable window views as stationed office workers.
2. The results of this study also show that contrary to age, gender has no significant effect on the reaction to the window view. The research suggest that the preferred window view motifs are associated with activities like work, but very significantly also to age and lifestyle. Given that the world population is ageing, further research should focus on specific population groups, especially the elderly, who spend a significant part of the day indoors due to limited mobility.
3. Furthermore, the results suggest that in the close window view, the visible angle becomes narrower, which limits the legibility of the building's tectonics. As a result, details such as the quality of the façade elements and surfaces have stronger influence on the observer's response to the window view. This study went a step further and identified the visual properties of the viewed facades that are responsible for the respondents' reactions to window views and suggested that their reactions are not uniform across the population spectrum.

The goal of this study was to stimulate a discussion about the future directions of the development of urban spaces, together with the phenomenon of the impact of the window view on psychological well-being. Given that the respondents reacted very consistently to comparable and unfavourable window views, in compact urban environments that do

not allow layered and diverse window views, predominantly negative reactions can be expected. Therefore, in such environments, it is prudent to provide some window view with several visual layers, namely allow distant views and include greenery and a rich architectural language. Lastly, since the lifespan of the buildings can be long, it is essential to thoroughly consider the degree of densification of the urban space to be able to preserve footings for the sustainable urban development of future densely populated cities.

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