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Association between Environmental Neighbourhood Attributes and Self-Reported Health Outcomes among Urban Residents in Eastern Europe: A Cross-Sectional Study

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Abstract: Environmental perception is a complex issue that has significant impacts on public health. Despite limited research on subjective perceptions of the environment in various global contexts, including Ukraine, this study aimed to identify perceived environmental factors among urban residents and to assess associations with various health indicators. This is a cross-sectional study using data from the national survey carried out in 2017 in Ukraine. Data on demographic, behavioural, socioeconomic, and lifestyle risk factors were processed. A factor analysis was used to identify three environmental factors: outdoor infrastructure, environment, and safety and roads. The associations between these factors and health indicators were assessed using complex samples logistic regression models. The study showed that perceived environmental factors were significantly associated with body mass index, physical activity, stroke, stress, and harmful habits. Outdoor infrastructure emerged as the most important factor associated with health-related outcomes. Environmental neighbourhood attributes can significantly impact an individual's health, highlighting the need for policies and interventions that promote healthy neighbourhood environments, including improvements in outdoor infrastructure, community resources, and safety measures. Our findings suggest that urban environmental improvements should be a priority in primary disease prevention, would positively impact public health, and would be beneficial to the community.

Keywords: neighbourhood environment; public health; risk factors; perception; outdoor infrastructure



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1. Introduction

The urban environment plays a crucial role in shaping the health and well-being of individuals. Research into the associations between environmental factors and public health is critical for developing strategies that improve health outcomes.

Environmental perceptions, sense of comfort, and their connection to human behaviour significantly impact urban health [1]. Favourable neighbourhood conditions, including opportunities for physical activity (PA), social support, accessible green spaces, and more, are pivotal for positive health effects.

Extensive research has stressed the role of housing conditions and neighbourhood quality in public health, with factors such as housing affordability, safety, quality, and access to services being positively associated with well-being [2]. Unequal access to these factors creates housing issues that increase the likelihood of multiple simultaneous health exposures and environmental risks [3]. For instance, the Index of Housing Insults developed in Australia demonstrated how various housing inadequacies affect health across multiple domains: Affordability, Safety, Quality of Dwelling, Quality of Residential Area, and Access to Services and Support [4].

Housing conditions, the quality of infrastructure, and the environment have been associated with perceived physical health in Germany [5]. A cross-sectional study of mortality in Belgium from 1991 to 2020 concluded that one in five deaths could be attributed to inequality in housing conditions [6]. Moreover, self-reported health and perceptions of environmental hazards are good indicators for assessing public health [7].

Environmental conditions are an inescapable part of daily life that can affect human health and play an important role in producing and maintaining health disparities [8]. There is evidence that disadvantaged communities encounter greater exposure to environmental hazards and pollutants.

Urban planning, transport systems, and terrain characteristics significantly affect people's health and well-being [9]. By indirectly influencing behaviour and PA levels, they affect health outcomes as well [10].

Research on perceptions of the environment can help to reveal the physiological response to stress, which is associated with both mental and physiological health [11]. It has been demonstrated that the accessibility of, availability of, and attachment to urban green spaces can affect health outcomes [12].

There is strong evidence that risk factors for non-communicable diseases are related to the impact of environmental attributes: living in a disadvantaged area is associated with a higher prevalence of CVD [13]. Multiple research findings have highlighted the importance of living environment and its effects on the risk of coronary heart disease [14], hypertension and triglyceride levels [15], self-reported general and mental health [7], and walking behaviour [16]. The WHO identified a set of diseases associated with the most significant environmental effects on global public health [9]. The top of the list—accounting only for the environmental fraction—included stroke, ischaemic heart disease, diarrhoeal diseases, lower respiratory infections, asthma, cancers, and neonatal conditions.

Our study is particularly timely given the concerning public health statistics in Ukraine, notably, the high prevalence of non-communicable diseases such as cardiovascular diseases (CVD). With circulatory system diseases alone accounting for a significant number of deaths in Kyiv [17], there is a pressing need to identify factors that may contribute to these health outcomes and develop targeted interventions.

In this study, we seek to contribute to this discourse by examining the relationship between environmental factors and urban public health. Our research expands upon previous studies by analysing a comprehensive set of neighbourhood environment characteristics, grouped into three underlying factors. By including a diverse sample of adults, we aim to provide a nuanced understanding of how environmental perceptions influence health outcomes.

Based on the relevant literature, we hypothesise that a positive perception of environmental factors in places of residence would be associated with lower health risks to urban public health.

Current research has identified associations between perceptions of key environmental characteristics and self-reported health outcomes. In other similar studies using subjective methods, perceptions of the environment were assessed in narrow cohorts of people: middle-aged women [7], adolescents [18], or the elderly [19]. Through our analysis, we aim to investigate the complex relationship between environmental factors and urban public health, ultimately informing policy and practice to improve the well-being of residents in Kyiv and similar urban settings. By elucidating the mechanisms through which the neighbourhood environment influences health outcomes, we hope to pave the way for comprehensive environmental improvements that reduce urban environmental risks and promote health equity.

2. Materials and Methods

2.1. Data Source, Study Design, and Sample

Data from a nationally representative survey on human health, healthy behaviour, and medical care in Ukraine were used. The research “Health Index. Ukraine (2017)”

was carried out with the financial and technical support of the Public Health Programme of the International Renaissance Foundation and the Project “Improving Health in the Service of the People” from the World Bank Office in Ukraine [20,21]. The final sample was representative of the adult population of Kyiv city.

The national household survey was carried out in May–June 2017 throughout Ukraine. The research was conducted on a multi-stage sample, random at each stage. A detailed description of the respondent selection procedure can be found in the official study report [20].

The research questionnaire used in the study was approved by the International Scientific Council [20]. The participants were interviewed at their place of residence by professional field interviewers using the face-to-face method. A total of 407 adults participated in the survey.

2.2. Measurements

2.2.1. Demographic and Socioeconomic Characteristics

Various demographic and socioeconomic characteristics were analysed. Sex and age were recorded. Four age categories were set: (1) 18–29 years, (2) 30–44 years, (3) 45–59 years, and (4) 60 years or over. Education level was classified into “Low” (primary or secondary, secondary school completed), “Medium” (vocational or specialised secondary education), and “High” (basic higher education (Bachelor), a university degree (Specialist or Master), or a scientific degree (PhD or DSc)). Employment status was dichotomised as “Employed” (full or part-time, self-employed, or a working pensioner) or “Non-employed” (temporarily unemployed, non-working and not looking for a job, a student, a non-working pensioner, or a person with a disability). The respondents were asked to indicate the number of cigarettes they smoked per day. The question “How many people, adults, and children (including you), live with you in the same household?” was asked to determine the number of people per household. Individual socioeconomic status (SES) was evaluated according to the respondents’ education, occupation, and financial situation.

2.2.2. Perception of the Neighbourhood Environment

To describe the respondents’ perception of the environment, they were asked to rate their place of residence according to the following characteristics: the quantity of outdoor sports grounds, the quality of the equipment in these sports grounds, the number of children’s outdoor playgrounds, the quality of the equipment in children’s playgrounds, the existence of green areas (trees, parks, alleys, and/or lawns), the environmental situation (clean air and water, etc.), safety during the day, safety at night, the presence of bicycle paths, and a general assessment of the surrounding area. The respondents evaluated each item on a scale from 1 to 5 (“very bad”, “bad”, “not bad”, “not good”, “good”, or “very good”). According to the results of the factor analysis, the aforementioned questions were grouped into three categories: “Outdoor infrastructure” (OI), “Environment”, and “Safety and roads” (SR). For each factor, the sum of the points of its components was calculated. Higher scores indicated more favourable neighbourhood conditions.

2.2.3. Health Indicators (Dependent Variables)

All health indicators of the respondents were self-reported. A self-assessment of health status was examined with the question “How do you assess your health status on a 5-point scale?” and was divided into three categories: (1) good/very good (4–5 points); (2) average (3 points); or (3) bad/very bad (2–1 point). Perception of the impact of the environment on individual health was assessed by the question “What, in your opinion, negatively affects your health—the environmental status, psychological stress, harmful habits, improper nutrition, the lack of physical activity, or inattention to yourself?” The presence of chronic diseases was recorded according to the answer to the question “Do you have any chronic or long-term diseases?” (yes/no).

Body mass index (BMI) is based on an individual's height and weight parameters ("How many kilograms do you weigh?" and "What is your height in centimetres?") and was calculated as kg/m^2 . Depending on their BMI, the respondents were divided into three categories: (1) normal weight ($\text{BMI} \leq 24.9$), (2) overweight ($\text{BMI} 25.0\text{--}29.9$), and (3) obese ($\text{BMI} \geq 30$) [22].

PA was examined with the question "How many hours or minutes per week do you engage in physical exercises of at least average intensity (consider not only activities at the gym, but also walking, cycling, planting, etc.—i.e., activities that make you pant and/or sweat)?" The indicated hours and minutes were calculated as minutes per week. According to the WHO recommendations on PA, the obtained data were dichotomised into two groups—sufficient (≥ 150 min per week) or insufficient PA (<150 min per week).

The presence of cardiovascular and chronic diseases was examined with questions "Have you ever had a heart attack (myocardial infarction)?" and "Do you have any of the following diseases: (1) hypertension (high blood pressure) (yes/no), (2) diabetes (yes/no), or (3) a stroke (stroke consequences) (yes/no)?" Systolic and diastolic blood pressure (BP) was recorded according to the question "What blood pressure (mmHg) do you usually have?". The obtained parameters were dichotomised as hypertension (if systolic BP was ≥ 140 mmHg and/or diastolic BP was ≥ 90 mmHg) or non-hypertension.

2.3. Statistical Analysis

The database owner created complex sample specifications, including statistical weight, and presented them in the raw file. Statistical weights were necessary, as the initial sample was overrepresented by specific categories of respondents and did not reflect the sex–age structure of the population of Ukraine.

A frequencies analysis was applied to the unweighted sample to display the percentages (%) of the demographic measures. The complex samples' frequencies with percentages, standard error (SE), and 95% confidence interval (CI) were used to calculate the statistics for demographic indicators in a weighted sample.

A principal component analysis with Varimax rotation and Kaiser normalisation was performed to extract factors of the perception of the neighbourhood environment. The Kaiser–Meyer–Olkin measure of sampling adequacy, Bartlett's test of sphericity, initial eigenvalues, and the percentage of the variance explained were recorded. Cronbach's alpha for each component was calculated for a reliability analysis of the selected factors.

Complex Samples Logistic Regression (CSLR) was used for a logistic regression analysis on a binary (PA, chronic or long-term diseases, heart attack, stroke, hypertension, environmental status, psychological stress, harmful habits, improper nutrition, lack of PA, and inattention to yourself) and multinomial (self-assessment of health status and BMI) dependent variable scale. To analyse the associations between the perception of environmental factors and health indicators, odds ratios (ORs) were calculated, indicating unadjusted and adjusted ORs and 95% CIs. All models were adjusted for covariates, including age (continuous), sex, employment status, education level, SES, the number of people in the household (continuous), the number of children in the household (continuous), BMI (continuous), chronic diseases, the number of cigarettes per day (continuous), PA, systolic BP (continuous), diastolic BP (continuous), infarction, diabetes, stroke, and hypertension. Before being included in the analysis, the covariates were tested for outliers. The covariates were analysed separately concerning their effect on the dependent variables; only statistically significant predictors were included in the final model. We used the method described elsewhere [23] to test the multiple hypotheses and the possible cumulative effect of alpha. Statistical significance was set at $p < 0.05$.

The statistical analysis was calculated using SPSS software version 26.0 (IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY, USA: IBM Corp.).

3. Results

Table 1 presents the characteristics of the study participants. The unweighted sample (column 1 of Table 1) did not correspond to either national statistics or the distribution among the population of Kyiv (Table 1). The primary sample was overrepresented by women and those over 45 years of age. The sample was weighted so that it matched the sex–age structure of Ukraine and Kyiv city.

Table 1. The demographic distribution between the study participants and the general population.

	Unweighted Sample (n = 407) (%)	Weighted Sample			National Data ** (N = 42,414,900) (%)	Permanent Population of Kyiv * (N = 2,884,500) (%)
		%	SE	95% CI Lower–Upper		
Sex						
Male	38.1	45.5	2.9	39.9–51.1	46.3 **	46.3 *
Female	61.9	54.5	2.9	48.9–60.1	53.7 **	53.7 *
Age group, years						
18–29	10.6	21.5	2.8	16.6–27.5	19.5 **	≥18 years–81.8 *
30–44	18.4	32.1	2.9	26.7–38.1	27.9 **	
45–59	35.6	24.3	2.0	20.5–28.4	25.7 **	
≥60	35.4	22.1	1.9	18.6–26.0	26.9 **	≥60 years–20.5 *
Education						
Primary or secondary	0.7	0.7	0.4	0.2–2.3		
Secondary school completed	7.1	9.8	1.9	6.7–14.3		
Vocational	11.6	10.2	1.6	7.4–13.9		
Specialized secondary education	16.7	13.8	1.8	10.6–17.8		
Basic higher education (Bachelor)	4.7	5.7	1.4	3.5–9.3		
University degree (Specialist, Master)	59.1	59.8	2.8	54.2–65.1		
Employment status						
Employed (full or part-time)	47.2	57.1	2.8	51.6–62.4		
Self-employed	1.7	1.4	0.6	0.6–3.1		
Temporarily unemployed; looking for a job	2.7	1.8	0.5	1.0–3.2		
Non-working and not looking for a job	0.7	0.9	0.6	0.3–3.0		
Student	5.2	6.3	1.4	3.9–9.8		
Working pensioner	4.2	8.4	1.9	5.3–13.0		
Non-working pensioner	35.1	21.7	1.8	18.3–25.5		
Disability	3.2	2.6	0.8	1.4–4.6		
Family’s financial situation						
We do not have enough money even for food	3.0	2.3	0.8	1.2–4.4		
We have enough money for food, but buying clothes is difficult	30.8	25.1	2.3	20.8–29.9		
We have enough money for food and clothes, and we can save a little, but not enough to buy expensive things	41.5	42.5	2.8	37.1–48.2		
We can afford to buy some expensive things or save money	24.4	29.9	2.8	24.8–35.6		
We can make significant savings	0.2	0.2	0.2	0.0–1.5		
Smoking status						
Smoking	17.5	22.9	2.6	18.2–28.4		
Non-smoking	82.5	77.1	2.6	71.6–81.8		
BMI						
Normal weight	42.6	52.6	2.9	46.9–58.1		
Overweight	38.1	34.3	2.7	29.2–39.8		
Obesity	19.3	13.1	1.6	10.3–16.6		
PA						
<150 min/week	62.7	55.9	2.9	50.2–61.5		
≥150 min/week	37.3	44.1	2.9	38.5–49.8		

Note: CI: confidence interval, SE: standard error, BMI: body mass index, PA: physical activity. * Permanent population of Kyiv <http://www.kiev.ukrstat.gov.ua/> (accessed on 6 February 2024), ** State Statistics Service of Ukraine <http://www.ukrstat.gov.ua/> (accessed on 6 February 2024).

The mean age of the respondents was 46.1 years (SE = 0.98), and 45.5% of them were males. Most of the respondents (59%) had a university degree and 57% were employed full-time or part-time. A satisfactory financial condition of the family was reported by 42% of the respondents. Of all the respondents, 77.1% were non-smokers. Most respondents (52.6%) were classified as having a normal weight, while 34.3% were overweight based on their BMI. Less than half (44%) of the respondents met the WHO recommendations on PA of at least 150 min of moderate-intensity PA per week.

The unobservable factor ratios through summarising all the items of the environmental perception questions are presented in Table 2. The factor analysis set as a three-factor

solution explained 64% of the variance. The Kaiser–Meyer–Olkin measure of sampling adequacy (0.83) and Bartlett’s test of sphericity with a significance level of $p < 0.001$ confirmed that the factor analysis was suitable for the questionnaire data. The first component labelled “Outdoor infrastructure” included four items and explained 41.5% of the variance with an initial eigenvalue of 4.15. The second factor, named “Environment”, contained three items, and explained 12.5% of the variance, and the initial eigenvalue was 1.25. The third factor, “Safety and roads”, included three items and explained 10% of the variance, the initial eigenvalue being 0.99. The reliability coefficients with Cronbach’s alpha for OI, Environment, and SR were 0.82, 0.74, and 0.57, respectively.

Table 2. Principal component analysis of the perception of the neighbourhood environment by Kyiv residents.

	Component		
	1	2	3
Outdoor infrastructure			
Quantity of outdoor sports grounds	0.712	0.353	0.078
Quality of equipment in sports grounds	0.728	0.279	0.143
Quantity of children’s outdoor playgrounds	0.810	0.076	0.244
Quality of equipment in children’s playgrounds	0.748	0.010	0.222
Environment			
Environmental situation: clean air and water, etc.	−0.004	0.823	0.313
General assessment of the surrounding area	0.295	0.777	0.284
Existence of green areas—trees, parks, alleys, and/or lawns	0.464	0.627	−0.028
Safety and roads			
Safety during the day	0.156	0.057	0.781
Safety at night	0.180	0.162	0.706
Presence of bicycle paths	0.140	0.285	0.585

Note: Extraction method—principal component analysis; rotation method—Varimax with Kaiser Normalization. Rotation converged in 6 iterations.

Table 3 shows the results of a complex samples logistic regression analysis examining the associations between the perceived environmental factors and health outcomes and lifestyle risk factors. Using factor scores as a continuous variable, we observed that a one-unit increase in the OI score was significantly associated with 15% lower odds of achieving a non-sufficient level of PA (OR 0.852, 95% CI 0.754–0.964) and with 22% and 57% higher odds of considering that health was negatively affected by psychological stress (OR 1.224, 95% CI 1.067–1.404) and harmful habits (OR 1.571, 95% CI 1.128–2.189), respectively. In the multinomial logistic regression, the odds of being overweight significantly decreased by almost 19% per one unit increase in the OI factor score (OR 0.807, 95% CI 0.709–0.918) after adjusting for the risk factors.

After adjusting for the risk factors, the results showed a 26% reduced risk of stroke (OR 0.740, 95% CI 0.550–0.996) and 26% increased odds of considering that health was negatively affected by psychological stress (OR 1.262, 95% CI 1.087–1.464) in the Environment factor score.

After adjusting for the covariates, a data analysis revealed that an increase in the SR factor score was significantly associated with 35% decreased odds of reaching a non-sufficient level of PA (OR 0.648, 95% CI 0.525–0.798) and 78% increased odds of considering that health was negatively affected by harmful habits (OR 1.779, 95% CI 1.108–2.856).

Table 3. Crude and adjusted odds ratios (aOR) of the perception of the effect of neighbourhood characteristics on chronic diseases and lifestyle risk factors.

Dependent Variable	Factor	Outdoor Infrastructure		Environment		Safety and Roads	
		Crude OR (95% CI)	aOR (95% CI)	Crude OR (95% CI)	aOR (95% CI)	Crude OR (95% CI)	aOR (95% CI)
Self-assessment of the health status ^a Good/Very good (ref.)	1	1	1	1	1	1	1
	Average	0.992 (0.888–1.109)	1.063 (0.928–1.218)	0.923 (0.802–1.063)	0.947 (0.780–1.150)	0.900 (0.761–1.064)	1.000 (0.825–1.212)
	Bad/very bad	0.936 (0.829–1.057)	1.064 (0.885–1.280)	0.848 (0.736–0.978) *	0.873 (0.698–1.093)	0.802 (0.656–0.981) *	0.946 (0.686–1.304)
BMI (groups) ^b Normal weight (ref.)	1	1	1	1	1	1	1
	Overweight	0.817 (0.722–0.924) *	0.807 (0.709–0.918) *	0.905 (0.784–1.045)	0.949 (0.802–1.124)	0.816 (0.689–0.966) *	0.869 (0.708–1.066)
	Obesity	0.904 (0.790–1.033)	0.941 (0.801–1.106)	0.904 (0.778–1.051)	0.955 (0.824–1.202)	0.810 (0.642–1.022)	1.004 (0.677–1.489)
PA ^c ≥150 min/week (ref.)	1	0.888 (0.793–0.995) *	0.852 (0.754–0.964) *	0.915 (0.804–1.040)	0.917 (0.794–1.060)	0.682 (0.563–0.825) **	0.648 (0.525–0.798) **
	1	1	1	1	1	1	1
Chronic or long-term diseases ^d No (ref.)	1	0.984 (0.888–1.090)	1.058 (0.922–1.213)	0.848 (0.750–0.959) *	0.916 (0.767–1.094)	0.775 (0.659–0.912) *	0.845 (0.664–1.076)
	1	1	1	1	1	1	1
Heart attack (infarction) ^e No (ref.)	1	0.913 (0.673–1.239)	0.961 (0.642–1.438)	0.757 (0.577–0.994) *	0.771 (0.569–1.046)	0.868 (0.676–1.114)	1.078 (0.689–1.685)
	1	1	1	1	1	1	1
Stroke (stroke consequences) ^f No (ref.)	1	1.024 (0.803–1.306)	1.114 (0.812–1.529)	0.760 (0.603–0.957) *	0.740 (0.550–0.996) *	0.677 (0.492–0.932) *	0.709 (0.467–1.075)
	1	1	1	1	1	1	1
Hypertension ^g No (ref.)	1	0.915 (0.826–1.015)	0.906 (0.774–1.060)	0.979 (0.868–1.103)	1.067 (0.928–1.226)	0.820 (0.702–0.958) *	0.878 (0.728–1.059)
	1	1	1	1	1	1	1
The environmental status ^h No (ref.)	1	1.122 (0.948–1.327)	1.101 (0.942–1.287)	1.092 (0.912–1.307)	1.073 (0.877–1.313)	1.291 (0.991–1.680) *	1.190 (0.948–1.494)
	1	1	1	1	1	1	1
Psychological stress ⁱ No (ref.)	1	1.173 (1.042–1.321) *	1.224 (1.067–1.404) *	1.258 (1.104–1.434) *	1.262 (1.087–1.464) *	1.138 (0.961–1.348)	0.969 (0.804–1.169)
	1	1	1	1	1	1	1
Harmful habits ^j No (ref.)	1	1.417 (1.158–1.734) *	1.571 (1.128–2.189) *	1.389 (1.104–1.749) *	1.108 (0.846–1.450)	1.548 (1.197–2.000) *	1.779 (1.108–2.856) *
	1	1	1	1	1	1	1
Improper nutrition ^k No (ref.)	1	1.085 (0.844–1.395)	1.201 (0.871–1.657)	1.014 (0.763–1.347)	1.118 (0.800–1.563)	1.075 (0.807–1.432)	1.059 (0.733–1.530)
	1	1	1	1	1	1	1
Lack of physical activity ^l No (ref.)	1	1.023 (0.857–1.220)	0.984 (0.814–1.188)	1.087 (0.863–1.369)	1.040 (0.815–1.328)	1.047 (0.809–1.355)	0.970 (0.720–1.305)
	1	1	1	1	1	1	1
Inattention to yourself ^m No (ref.)	1	1.031 (0.930–1.144)	1.094 (0.967–1.238)	1.007 (0.881–1.151)	1.004 (0.874–1.153)	0.874 (0.742–1.030)	1.007 (0.826–1.227)
	1	1	1	1	1	1	1

Note: * $p < 0.05$; ** $p < 0.001$; ^a, Multinomial LR; Model adjusted for sex, employment status, smoking status, diabetes, BMI (cont.), age (cont.), systolic BP (cont.), and diastolic BP (cont.); ^b, Multinomial LR; Model adjusted for age (cont.), education level, employment status, chronic diseases, infarction, hypertension, diabetes, stroke, PA, systolic BP (cont.), and diastolic BP (cont.); ^c, Model adjusted for age (cont.), sex, SES, BMI (cont.), chronic diseases, number of people in the household (cont.), and hypertension; ^d, Model adjusted for employment status, age (cont.), BMI (cont.), systolic BP (cont.), diastolic BP (cont.), and the number of cigarettes per day (cont.); ^e, Model adjusted for sex, chronic diseases, hypertension, BMI (cont.), and age (cont.); ^f, Model adjusted for age (cont.), sex, and systolic BP (cont.); ^g, Model adjusted for age (cont.), education level, chronic diseases, number of children in the household (cont.), and BMI (cont.); ^h, Model adjusted for age (cont.), sex, hypertension, PA, and the number of people in the household (cont.); ⁱ, Model adjusted for SES, PA, sex, hypertension, age (cont.), and BMI (cont.); ^j, Model adjusted for sex, age (cont.), education level, hypertension, chronic diseases, number of cigarettes per day (cont.), and BMI (cont.); ^k, Model adjusted for sex, age (cont.), employment status, PA, BMI (cont.), hypertension, and chronic diseases; ^l, Model adjusted for sex, education level, age (cont.), number of children in the household (cont.), and BMI (cont.); ^m, Model adjusted for sex, chronic diseases, education level, hypertension, PA, age (cont.), and BMI (cont.).

4. Discussion

Our study explored the associations between perceived environmental factors and several health-related outcomes. The human social setting is impossible without the neighbourhood environment. A residential area's convenience, safety, and advancement can affect residents' health [24]. The most significant associations in our study were found between the perceived neighbourhood environmental factors and BMI, PA, stroke, stress, and harmful habits. Previous studies have found evidence that individual perceptions of

the neighbourhood and built environment characteristics (e.g., a variety of play areas and recreational facilities) are associated with PA levels [25,26]. Research [24] has demonstrated that more comfortable public facilities can increase PA levels.

A meta-analysis showed that high levels of leisure-time PA compared to low PA resulted in a protective effect against general, haemorrhagic, and ischemic stroke [25]. A study from the Netherlands [27] highlighted that a low feeling of safety was associated with poorer self-rated health at the individual and neighbourhood levels. Crime issues in neighbourhoods with high poverty hamper women and adults' use of parks without footpaths [28]. A longitudinal representative cohort study [29] discovered that perceived measurements of the local residential environment were related to metabolic syndrome in Australia. Another study [26] found a protective effect of walkable neighbourhoods on obesity-related outcomes. A longitudinal study [30] showed that a perceived lack of access to local amenities decreased levels of PA and walking and affected the increase in BMI, thereby increasing the risk of developing type 2 diabetes. Subjective environmental and perception analyses have been applied in different countries, and the studied indicators vary. For example, a study in China [24] brought about the following factors for research: dwelling environment, public facilities convenience, public security, and neighbourhood relationships. A study from the Netherlands [27] singled out two factors: social and physical environment. Research in North Carolina [31] used the following factors with a 5-point Likert-response format: aesthetics, walkability, safety, and social cohesion. A study on perceived residential environment quality in Italy [32] presented instruments measuring the inhabitants' perceived quality of their neighbourhood in urban places, which consisted of perceived residential environment quality and neighbourhood attachment indicators. The evaluation included spatial aspects (architectural planning space and organisation and accessibility of space), human aspects (people and social relations), functional aspects (welfare, recreational, commercial, and transportation services), and contextual aspects (pace of life and environmental health). Some studies included problems in the neighbourhood related to crime, traffic, rubbish [33], and GIS-based metrics [34] to investigate the associations between the perceived neighbourhood environment and health.

The environmental factors revealed in the current research complement the previously unknown subjective perceptions of the neighbourhood environment among urban residents and, at the same time, are in line with previous studies. Our findings may apply to other urban areas, especially identifying inequalities in urban health risks [16]. Our models were carefully adjusted for important individual demographic, behavioural, and socioeconomic variables. Each covariate was selected singly for the model, minimising the risk of confounding.

The present study makes an important contribution by investigating the associations between perceived neighbourhood environment factors and urban residents' health. It is important to have a comprehensive tool for the assessment of subjective perceptions of the neighbourhood environment, including all the neighbourhood environment characteristics, as well as urban design elements and psychological aspects, and their effects on subjective health and well-being. The creation of a healthy and harmonious neighbourhood environment for citizens, taking into account the most important factors that determine satisfaction and positive perception of their living environment, is considered to be one of the main goals in improving health and well-being.

Limitations of This Study

The cross-sectional study design limits the evidence for a causal association of the findings. Health data were self-reported. The value of Cronbach's alpha for the SR factor was 0.6, which is considered to be moderate, but with an acceptable level of reliability. Finally, it was noted that people with poor health conditions tend to think more pessimistically [16]. Therefore, people might have assessed both their health and the environment at a relatively limited level. Future analyses should also take into account objectively measured environmental attributes.

5. Conclusions

The main purpose of the present study was to examine the significance of the associations between perceived environmental neighbourhood attributes and self-reported health indicators and outcomes. This study showed that the perception of environmental factors in the urban neighbourhood was associated with health-related outcomes. The outdoor infrastructure factor was the most relevant and most strongly associated with health status. Significant interactions were found with body mass index, PA, stroke, stress, and harmful habits. In order to improve the health of urban residents, policy interventions should prioritise developing more resilient and prosperous neighbourhoods, improving safety, and promoting more favourable recreational and sports-friendly environments. Our findings suggest that urban environmental improvements should be a priority in primary disease prevention, would positively impact public health, and would be beneficial to the community.

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Informed Consent Statement: The participants provided their oral informed consent to participate in this study. The research was conducted in accordance with Ukrainian legislation on bioethics.

Data Availability Statement: The available data are accessible with the database owner’s permission.

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