

Article

Perceived Disorder, Fear of Crime, and Safety in Urban Parks: A Structural Equation Modeling Study from a Large Metropolitan Green Area in Florence, Italy

Claudio Fagarazzi ¹, Matteo Andaloro ², Giacomo Cappelli ², Nicola Marini ², Federico Olimpi ²
and Iacopo Bernetti ^{1,*}

¹ Department of Agriculture, Food, Environment and Forestry (DAGRI), University of Florence, Piazzale delle Cascine 18, 50144 Florence, Italy; claudio.fagarazzi@unifi.it

² Forestry Systems Science and Technology, University of Florence, Piazzale delle Cascine 18, 50144 Florence, Italy; matteo.andaloro@edu.unifi.it (M.A.); giacomo.cappelli4@edu.unifi.it (G.C.); nicola.marini@edu.unifi.it (N.M.); federico.olimpi@edu.unifi.it (F.O.)

* Correspondence: iacopo.bernetti@unifi.it

Abstract

Urban parks are key components of metropolitan green infrastructure, contributing to residents' well-being. However, perceptions of disorder and safety may substantially shape how these spaces are experienced, particularly during evening hours. This study investigates the structural relationships between perceived disorder, fear of crime, avoidance behaviors, perceived safety, and service satisfaction. The primary objective is to disentangle the pathways linking disorder perceptions to behavioral and perceptual outcomes using a Structural Equation Modeling (SEM) framework. A structured survey was administered to users of a large metropolitan urban park (N = 742). Latent constructs representing Perceived Disorder, Fear of Crime, Avoidance Behaviors, and Service Satisfaction were specified, controlling for Age and Gender. The SEM was estimated using robust methods for ordinal indicators. The measurement model demonstrated good reliability and validity. Results indicate that Perceived Disorder acts as a strong precursor to Fear of Crime. Fear of Crime emerged as a pivotal mediator, significantly increasing Avoidance Behaviors and strongly reducing Perceived Safety at night. Furthermore, significant demographic effects were observed: female users reported significantly higher levels of fear, while age showed a direct positive association with perceived safety. While disorder strongly impacted the emotional and behavioral dimensions (fear and avoidance), its direct link to Service Satisfaction was less prominent compared to safety perceptions. The findings suggest that the impact of disorder on the park experience is largely channeled through psychological mechanisms of fear. Integrated policies addressing social disorder and fear reduction are likely to be more effective than purely physical interventions to enhance safety perceptions and park usage.



Academic Editor: Thomas W. Sanchez

Received: 12 February 2026

Revised: 1 March 2026

Accepted: 10 March 2026

Published: 20 March 2026

Copyright: © 2026 by the authors.

Licensee MDPI, Basel, Switzerland.

This article is an open access article distributed under the terms and conditions of the [Creative Commons Attribution \(CC BY\)](https://creativecommons.org/licenses/by/4.0/) license.

Keywords: urban parks; perceived disorder; fear of crime; perceived safety; avoidance behaviors; Structural Equation Modeling (SEM); service satisfaction

1. Introduction

Urban green spaces constitute a critical element of metropolitan infrastructure, providing ecosystem services that are essential for public health and psychological restoration. However, the potential of these spaces to deliver recreational and social benefits is strictly

conditional on their accessibility and the quality of the user experience. Among the factors inhibiting park usage, safety concerns and perceived environmental degradation represent the most significant barriers. Systematic reviews indicate that fear of crime in urban green spaces is a complex phenomenon driven by a socio-ecological interplay of individual attributes, social factors, and physical characteristics of the environment [1]. When public spaces are perceived as unsafe, their function shifts from being assets of urban resilience to becoming underutilized areas, exacerbating social segregation.

Beyond physical and spatial characteristics, a substantial body of literature emphasizes that perceptions of safety in urban green spaces are strongly shaped by social factors related to the presence, composition, and behavior of other users [2–5]. The perceived absence of legitimate users or, conversely, the dominance of specific social groups engaging in activities considered deviant or unpredictable, has been consistently associated with heightened fear of crime and avoidance behaviors [6–9]. Empirical studies demonstrate that the density and diversity of users play a crucial role in shaping perceived safety; however, this relationship is non-linear, as behaviors perceived as socially marginal can override the reassuring effect of user density [7,10,11].

These dynamics are closely linked to the concept of social disorder, understood as visible signs of norm violations and weak regulation of public behavior. Social disorder functions as a cognitive cue signaling the absence of guardianship and institutional control, thereby amplifying perceptions of vulnerability [9,10,12]. Another critical dimension influencing safety perceptions is the reputation of place, which emerges through shared narratives, media representations, and word-of-mouth communication [13,14]. Negative reputational labels contribute to self-reinforcing cycles of avoidance, reduced legitimate use, and further degradation of social control [9,15].

Finally, the literature underscores the importance of informal surveillance and guardianship through the presence of regular users, nearby residents, staff, and commercial activities [5,16]. The lack of such diffuse social oversight has been identified as a critical weakness in large urban parks, particularly during evening and nighttime periods [11,17].

Theoretical frameworks linking the physical environment to user perception have often relied on the identification of specific “fear-evoking” factors [18]. Early research established that proximate physical cues—such as limited visual prospects, concealment opportunities for potential offenders, and blocked escape routes—significantly heighten feelings of insecurity [6]. Specifically, the spatial configuration of vegetation and woodland edges plays a dual role: while aesthetically pleasing, dense vegetation can obstruct visibility and trigger stress [19]. Importantly, these physical cues do not operate in isolation but acquire meaning through users’ interpretations of potential social interactions and threats. In this sense, environmental features act as contextual amplifiers of perceived risk, shaping expectations about the presence, behavior, and controllability of others in space.

These environmental determinants have been widely operationalized through Crime Prevention Through Environmental Design (CPTED) principles, which seek to mitigate fear by modifying the built environment to increase natural surveillance and reduce entrapment spots [17].

Recent advancements in the field have moved beyond simple correlational analyses to more sophisticated methodological approaches, such as SEM and Partial Least Squares (PLS-SEM), to measure these latent constructs [11]. These advanced multivariate techniques allow researchers to model complex pathways where “perceived safety” is not just an outcome but a mediator interacting with variables such as place attachment, time spent in the park, and gender [11,20]. For instance, recent PLS-SEM applications have demonstrated that aesthetic judgments and visual cues directly influence safety perceptions through constructs like entrapment and concealment [21]. Furthermore, the need for robust psycho-

metric validation of safety scales—moving beyond single-item measures of “fear”—has been emphasized to capture the multidimensional nature of the park experience, including wayfinding and environmental satisfaction [22,23].

Despite these methodological advances, there remains a need to better disentangle the specific structural pathways linking perceived disorder (social and physical incivilities) to quality-of-life outcomes, specifically distinguishing between the emotional reaction (fear of crime) and the behavioral response (avoidance). Current research often treats these variables in isolation. There is a specific need to understand if disorder directly degrades satisfaction or if its impact is fully mediated by the psychological mechanism of fear and the subsequent restriction of behavior.

This study addresses these gaps by proposing and testing a theory-driven SEM applied to a large metropolitan urban park. The primary objective is to analyze the complex mechanisms linking perceived disorder, service satisfaction, and perceived nighttime safety, specifically testing the mediating role of fear of crime and avoidance behaviors. By employing robust estimation methods for ordinal indicators and controlling for demographic factors such as gender and age—which are known to moderate safety perceptions [11,20]—the research seeks to isolate the specific pathways that link the social environment to user experience.

The principal conclusions of this work highlight that perceived disorder operates fundamentally through a fear-based mechanism rather than a direct dissatisfaction pathway. Our results suggest that disorder triggers fear of crime, which in turn drives avoidance behaviors and drastically reduces perceived safety, particularly during nighttime hours. Consequently, the overall user experience and the successful use of the park are dependent on a chain of psychological perceptions. These findings offer empirical evidence to support management strategies that integrate physical upkeep with social control policies.

2. Materials and Methods

2.1. Cascine Park (Florence, Italy) as Case Study

The study focuses on the Cascine Park, the largest public green space in Florence, Italy, extending over approximately 160 hectares along the right bank of the Arno River (43°47′04″ N 11°13′07″ E) (Figure 1). Historically, the area originated in the 16th century as a farming and hunting estate for the Medici family; its name derives from the *cascine* (dairy farms) established for agricultural production. Transformed into a monumental park and opened to the public by the Lorraine Grand Dukes in the late 18th century, it has since evolved into the primary “green lung” of the metropolitan area.

Today, the park is a multifunctional hub easily accessible via an extensive network of pedestrian and cycling paths and a dedicated tramway line. It hosts a diverse range of amenities, including university facilities, sports complexes, the “Le Pavoniere” swimming pool, cultural venues, and a large amphitheater for public events. Despite its high recreational value, the park presents significant security challenges that contrast with its potential as a social aggregator. Critical issues are frequently reported, particularly along peripheral avenues and during evening hours, often exacerbated by insufficient lighting and perceived lack of formal control in secluded zones (Figure 2).

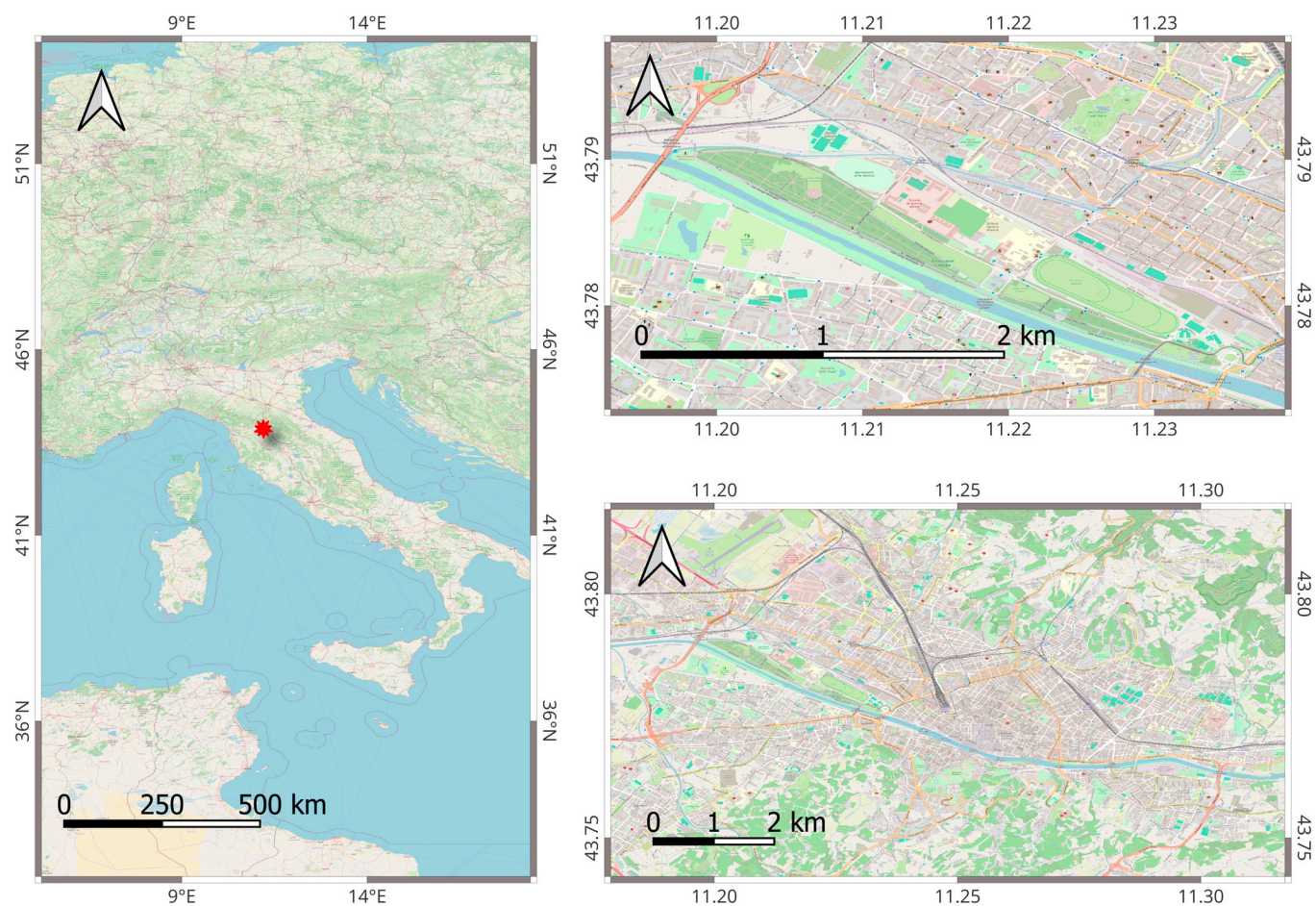


Figure 1. Study area.



Figure 2. Positive heritage elements (green) and negative elements of degradation and critical issues (red) in the study area.

Local news outlets and web-based sources have reported incidents involving assaults, robberies, drug dealing, and social disorder, which have contributed to shaping a problematic reputation of the park, particularly in peripheral areas and near major access routes.

Although current surveillance measures include 24 h coverage by approximately 10 patrols and CCTV systems concentrated around the central Piazzale and tram stops, user perception of safety remains complex. While recent official data suggest a reduction in theft and robbery rates compared to 2023, the persistence of perceived social disorder continues to generate avoidance behaviors and safety concerns among citizens.

The Cascine Park can be considered a paradigmatic example of a monumental historical park embedded within a contemporary metropolitan fabric that faces security challenges increasingly observed in many European urban contexts. Originating as a Medici estate and redesigned in the 18th century, the park reflects the typical challenge faced by many European cities: the tension between the conservation of historical heritage and modern security requirements. Its layout—characterized by long perspective avenues and dense historical vegetation—was conceived for aesthetic and aristocratic purposes, and may, in some cases, conflict with modern CPTED principles (e.g., visibility, natural surveillance, cfr. Figure 2).

Consequently, the Cascine Park serves as an ideal “living laboratory” to understand how perceived disorder and fear emerge in spaces where structural modification is limited by preservation constraints. The findings derived from this context are thus highly transferable to other historical urban green spaces where management must balance the preservation of cultural identity with the urgent demand for user safety.

2.2. Sampling Technique and Primary Data Collection

The study employed a cross-sectional survey design utilizing a structured questionnaire administered online via the Google Forms platform. Data collection relied on a mixed-mode survey design, integrating face-to-face administration with CAWI (Computer-Assisted Web Interviewing) [24,25]. The latter involved self-administered online questionnaires distributed via web links, public and private social media channels, and printed flyers made available at park information points. Data collection took place between December 2025 and January 2026. A non-probabilistic snowball sampling technique was adopted to maximize reach among the diverse user population of the Cascine Park. The survey link was disseminated through social media channels, local community groups, and flyers, with QR codes, distributed on street-market days.

Respondents were informed about the study’s objectives—specifically, the economic and social valuation of park safety—and the absolute anonymity of the data processing. Formal ethical review and approval were not required for this study, as it was a minimal-risk, non-interventional survey involving adult participants with no collection of directly identifiable personal data. Furthermore, the research does not fall within the scope of EU or Italian clinical trial legislation requiring ethics committee approval for interventional biomedical research (e.g., Regulation (EU) No 536/2014; Regulation of the European Parliament and of the Council of 16 April 2014 on Clinical Trials on Medicinal Products for Human Use. European Union: Brussels, Belgium, 2014.). All data processing strictly complied with the European General Data Protection Regulation (GDPR, Regulation (EU) 2016/679) and the Italian Privacy Code (D.Lgs. 196/2003, as amended by D.Lgs. 101/2018). A total of 933 questionnaires were collected. After data cleaning (removing incomplete responses and speeders), a final sample of 742 valid observations was retained for the Structural Equation Modeling analysis.

Regarding the demographic composition of the final sample (N = 933), females accounted for 56.5% and males for 41.9% (with 1.6% identifying as other or preferring

not to specify). The sample was predominantly composed of young adults, with the 18–24 and 25–34 age cohorts representing 64.2% of the total respondents. The complete database collected through the questionnaire is available in the Supplementary Materials.

Because official statistics detailing the exact demographic profile of Cascine Park users are unavailable, the representativeness of the sample was cautiously evaluated against the official demographic census of the Municipality of Florence (approx. 367,000 residents; 53% female, 47% male; average age 47.6 years). While the gender distribution of our sample closely mirrors the city's overall population, our data exhibits a clear overrepresentation of younger adults compared to the general census. This demographic skew towards younger, highly educated users (with over 90% holding a high school diploma or university degree) is a recognized outcome of CAWI and social-media-driven snowball sampling, which tends to capture digitally active demographics more readily than older cohorts.

2.3. Measures

The questionnaire items were operationalized based on established psychometric scales from urban sociology and environmental psychology literature. The constructs specified in the SEM analysis were measured as follows:

Perceived Disorder (Social and Physical): Consistent with the “Broken Windows” framework [7,26], disorder was measured as a latent construct driven by 8 observable indicators. Respondents were asked to rate the frequency with which they noticed specific incivilities in the park, including drug dealing, drug use, alcohol abuse, vandalism, prostitution, homelessness, illegal vehicle transit, and noise. Responses were recorded on a 5-point ordinal scale ranging from 1 (“Never”) to 5 (“Always”). However, the inclusion of these specific indicators—particularly homelessness and prostitution—requires critical epistemological and ethical contextualization. Drawing on sociological critiques of the Broken Windows theory [27], we acknowledge that “disorder” is not an objective environmental baseline, but rather a socially constructed perception. Labeling structural disadvantages or vulnerable groups (such as homeless individuals) merely as “incivilities” carries the risk of normative bias and can inadvertently support exclusionary urban policies [28]. In this study, these items were included in the survey instrument strictly to capture the subjective environmental cues that historically trigger fear and anxiety among park users, aligning with traditional environmental psychology metrics. Therefore, “disorder” is analyzed in our model purely as a perceived psychological stressor from the observer's viewpoint, not as an objective measure of criminality or moral decay.

Fear of Crime: Following Ferraro's risk interpretation model [29], this construct was operationalized through spatial and temporal avoidance indicators. Specifically, two key items measured the extent to which users intentionally avoid specific zones of the park (avoid_zones) or avoid the park entirely during nighttime hours (avoid_night) due to insecurity. These were measured on a 5-point ordinal scale.

Avoidance Behaviors (Coping Strategies): Distinct from the emotional reaction of fear, this latent variable captured active behavioral adaptations [1]. It comprised 6 items assessing defensive actions, such as reducing visit frequency, changing visitation times, avoiding visiting alone, changing routes, avoiding carrying valuables, and adopting defensive behaviors. These items were measured on a 5-point ordinal frequency scale (1 = “Never” to 5 = “Always”).

It is important to clarify the operationalization of the ‘Fear of Crime’ and ‘Avoidance Behaviors’ constructs. In this study, the decision not to include direct affective or cognitive-emotional indicators of fear (such as anxiety or specific worry) was methodological, aligning with the urban planning nature of the survey. We adopted an environmental criminology perspective where fear is heavily contextualized [30,31]. Thus, ‘Fear of Crime’ was op-

erationalized through the spatio-temporal manifestation of unsafety (avoiding the park at night or avoiding specific zones), effectively capturing the environmental locus of fear. Conversely, 'Avoidance Behaviors' was conceptualized as the set of active, tactical coping strategies deployed by users to navigate the space safely (e.g., changing routes, hiding valuables, assuming defensive body language). While the former measures the spatial-temporal boundaries of perceived risk, the latter measures the concrete behavioral adaptations.

Service Satisfaction: To assess the quality of the park's amenities, a latent construct was defined using 10 items covering cleanliness, greenery maintenance, lighting, traffic safety, playgrounds, dog areas, furniture, public transport, accessibility, and mixed-use functions. Given the broader range of evaluation, these items were measured on an 11-point numerical scale (0 = "Completely Dissatisfied" to 10 = "Completely Satisfied") [32].

Perceived Safety (Outcome): The primary outcome variable was the overall perception of safety during nighttime hours (safety_night), measured on a single-item 11-point scale (0 = "Unsafe" to 10 = "Completely Safe"). Single-item measures for global safety assessments are widely accepted in victimization surveys as reliable indicators of the general feeling of security [33].

Covariates: Gender (dummy coded: 1 = Female, 0 = Male) and Age (continuous) were included as exogenous control variables to account for demographic differentials in fear and safety perception.

2.4. Data Processing and Analysis

Data analysis was performed using the R statistical environment version 0.6-19 [34]. The SEM analysis was conducted using the lavaan package [34].

Given the nature of the dataset, which comprises both ordinal variables (measured on 5-point Likert scales for disorder, fear, and avoidance) and continuous/quasi-continuous variables (0–10 scales for satisfaction and safety), the model was estimated using the Weighted Least Squares Mean and Variance-adjusted (WLSMV) estimator. This method uses a diagonally weighted least squares (DWLS) matrix for parameter estimation and the full weight matrix for standard errors and mean- and variance-adjusted test statistics. WLSMV is robust to non-normality and is widely considered the preferred estimator for modeling categorical or ordinal data in SEM [35,36].

The analytical framework was specified in two stages: a measurement model (Confirmatory Factor Analysis) and a structural model.

2.4.1. Measurement Model

The measurement model specifies the linear relationship between the unobserved latent constructs and the observed indicators. Following the standard notation for Confirmatory Factor Analysis (CFA), the measurement equations generally take the form:

$$x_i = \lambda_i \xi + \delta_i \quad (1)$$

where x_i represents the i -th observed indicator, λ_i is the factor loading relating the indicator to the latent construct (ξ), and δ_i is the measurement error. Specifically, the four latent constructs were operationalized through the following systems of equations:

Perceived Disorder (ξ_{Disorder}) defined as a higher-order exogenous construct measured by eight indicators representing social and physical incivilities:

$$\begin{aligned}x_{\text{DrugDeal}} &= \lambda_1 \xi_{\text{Disorder}} + \delta_1 \\x_{\text{DrugUse}} &= \lambda_2 \xi_{\text{Disorder}} + \delta_2 \\x_{\text{Alcohol}} &= \lambda_3 \xi_{\text{Disorder}} + \delta_3 \\x_{\text{Vandalism}} &= \lambda_4 \xi_{\text{Disorder}} + \delta_4 \\x_{\text{Prostitution}} &= \lambda_5 \xi_{\text{Disorder}} + \delta_5 \\x_{\text{Homeless}} &= \lambda_6 \xi_{\text{Disorder}} + \delta_6 \\x_{\text{IllegalVeh}} &= \lambda_7 \xi_{\text{Disorder}} + \delta_7 \\x_{\text{Noise}} &= \lambda_8 \xi_{\text{Disorder}} + \delta_8\end{aligned}\quad (2)$$

Fear of Crime (η_{Fear}), reflecting spatial and temporal avoidance due to insecurity:

$$\begin{aligned}y_{\text{AvoidZones}} &= \lambda_9 \eta_{\text{Fear}} + \epsilon_1 \\y_{\text{AvoidNight}} &= \lambda_{10} \eta_{\text{Fear}} + \epsilon_2\end{aligned}\quad (3)$$

with ϵ is the measurement error.

Avoidance Behaviors ($\eta_{\text{Avoidance}}$), capturing active behavioral coping strategies:

$$\begin{aligned}y_{\text{VisitFreq}} &= \lambda_{11} \eta_{\text{Avoidance}} + \epsilon_3 \\y_{\text{Time}} &= \lambda_{12} \eta_{\text{Avoidance}} + \epsilon_4 \\y_{\text{Alone}} &= \lambda_{13} \eta_{\text{Avoidance}} + \epsilon_5 \\y_{\text{Route}} &= \lambda_{14} \eta_{\text{Avoidance}} + \epsilon_6 \\y_{\text{Valuables}} &= \lambda_{15} \eta_{\text{Avoidance}} + \epsilon_7 \\y_{\text{Defensive}} &= \lambda_{16} \eta_{\text{Avoidance}} + \epsilon_8\end{aligned}\quad (4)$$

Service Satisfaction ($\eta_{\text{Satisfaction}}$), evaluating the quality of specific park amenities:

$$\begin{aligned}y_{\text{Cleanliness}} &= \lambda_{17} \eta_{\text{Satisfaction}} + \epsilon_9 \\y_{\text{Green}} &= \lambda_{18} \eta_{\text{Satisfaction}} + \epsilon_{10} \\y_{\text{Lighting}} &= \lambda_{19} \eta_{\text{Satisfaction}} + \epsilon_{11} \\y_{\text{Traffic}} &= \lambda_{20} \eta_{\text{Satisfaction}} + \epsilon_{12} \\y_{\text{Playgrounds}} &= \lambda_{21} \eta_{\text{Satisfaction}} + \epsilon_{13} \\y_{\text{DogAreas}} &= \lambda_{22} \eta_{\text{Satisfaction}} + \epsilon_{14} \\y_{\text{Furniture}} &= \lambda_{23} \eta_{\text{Satisfaction}} + \epsilon_{15} \\y_{\text{Transport}} &= \lambda_{24} \eta_{\text{Satisfaction}} + \epsilon_{16} \\y_{\text{Access}} &= \lambda_{25} \eta_{\text{Satisfaction}} + \epsilon_{17} \\y_{\text{MixedUse}} &= \lambda_{26} \eta_{\text{Satisfaction}} + \epsilon_{18}\end{aligned}\quad (5)$$

2.4.2. Structural Model

The structural relationships were simultaneously estimated to test direct and mediated pathways. Specifically, the model posits that Perceived Disorder predicts Fear and Avoidance, while Safety and Satisfaction are endogenous outcomes.

The structural equations for the endogenous variables can be formalized as follows:

$$\begin{aligned}\text{Fear} &= \beta_1 \text{Disorder} + \gamma_1 \text{Gender} + \gamma_2 \text{Age} + \zeta_1 \\ \text{Safety}_{\text{nigh}} &= \beta_2 \text{Fear} + \beta_3 \text{Satisfaction} + \gamma_3 \text{Gender} + \gamma_4 \text{Age} + \zeta_2 \\ \text{Avoidance} &= \beta_5 \text{Fear} + \beta_6 \text{Disorder} + \zeta_3 \\ \text{Satisfaction} &= \beta_7 \text{Disorder} + \zeta_4\end{aligned}\quad (6)$$

where β represents the regression coefficients between latent variables, γ represents the effects of covariates (Gender and Age), and ζ represents the disturbance terms (unexplained variance).

The structural relationships between the latent constructs and the primary outcome are visually represented in Figure 3. The path diagram highlights the directional dependencies, showing how perceived disorder influences fear and avoidance behaviors, and how these factors, mediated by service satisfaction, ultimately determine the perception of nighttime safety.

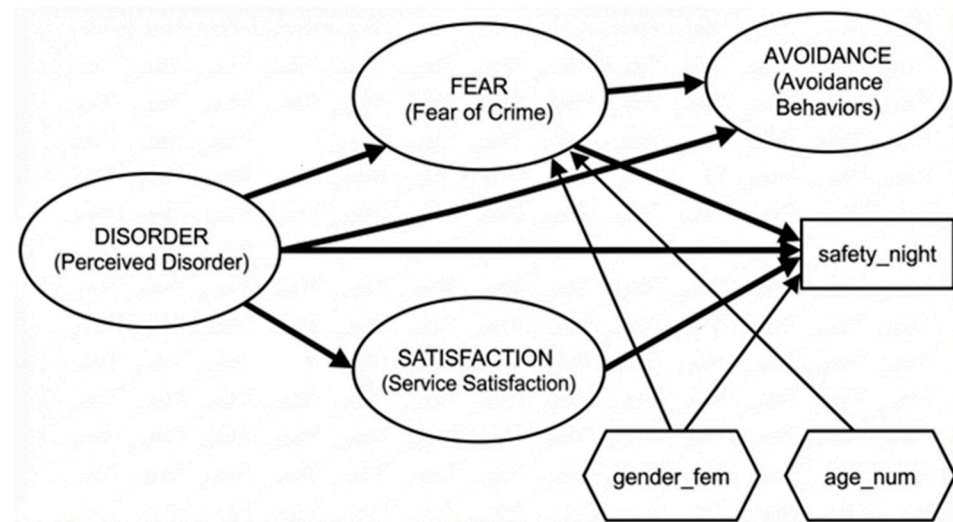


Figure 3. Path diagram of the final Structural Equation Model.

2.4.3. Model Evaluation

The evaluation of the model's goodness-of-fit relied on a multi-faceted approach, avoiding reliance on a single statistical test, such as the Chi-square (χ^2), which is known to be overly sensitive to large sample sizes and can lead to the rejection of theoretically plausible models.

Instead, a comprehensive assessment was conducted by combining absolute and incremental fit indices, a strategy that provides a more robust validation of how well the hypothesized structure replicates the observed covariance matrix.

To assess the model's improvement relative to a baseline null model, we utilized the Comparative Fit Index (CFI) and the Tucker–Lewis Index (TLI).

These incremental indices are essential for quantifying relative fit; specifically, the TLI serves a complementary function to the CFI by introducing a penalty for model complexity, thereby favoring parsimony and ensuring that the model is not over-parameterized. For both indices, values exceeding 0.95 were adopted as the threshold for excellent fit, indicating that the specified relationships account for the vast majority of the variance in the data compared to an independence model.

In parallel, absolute fit was examined using the Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR). The RMSEA is particularly valuable as it assesses the error of approximation in the population rather than merely the sample, with the upper bound of its 90% confidence interval providing a stringent test of close fit. Complementing this probabilistic measure, the SRMR provides a descriptive assessment of the average standardized difference between observed and predicted correlations, offering a direct indication of the model's predictive accuracy.

Following the rigorous combinatorial guidelines proposed by Hu and Bentler [37], a model was considered to exhibit a good fit if it simultaneously satisfied the criteria of an $RMSEA \leq 0.06$ and an $SRMR \leq 0.08$. This dual strategy is critical as it mitigates the specific

biases inherent in individual indices, balancing sensitivity to model misspecification with robustness against sample size variations.

Finally, beyond global model fit, the psychometric quality of the measurement model was validated by examining the internal structure of the latent variables. Composite Reliability (CR) was calculated to ensure internal consistency, offering a more robust alternative to Cronbach's alpha for structural equation modeling contexts [38,39]. Concurrently, Average Variance Extracted (AVE) was employed to assess convergent validity, verifying that the variance explained by the constructs significantly outweighed the measurement error [38,39]. This step ensures that the structural relationships identified in the subsequent path analysis are based on reliable and distinct theoretical constructs.

To address potential concerns regarding conceptual overlap between theoretically proximal constructs—specifically Fear of Crime and Avoidance Behaviors—we performed formal tests of discriminant validity using the Fornell–Larcker criterion [38]. This criterion dictates that the AVE of each latent construct must be greater than the squared correlation (r^2) between that construct and any other in the model. The standardized correlation between Fear of Crime and Avoidance Behaviors was found to be 0.635, resulting in a shared variance (r^2) of 0.403. Since the AVE for Fear of Crime (0.770) and Avoidance Behaviors (0.557) both substantially exceed the shared variance (0.403), discriminant validity is formally established. This confirms that, despite their theoretical proximity, the measurement model successfully discriminates between spatio-temporal fear and tactical behavioral coping.

3. Results

3.1. Measurement Model Assessment and Factor Analysis

The psychometric validation of the survey instrument was a prerequisite for testing the structural hypotheses. The CFA demonstrated that the measurement model fits the empirical data excellently. The Chi-square statistic was significant ($\chi^2 = 590.455$, $df = 367$, $p < 0.001$), a result largely expected given the sample size ($N = 933$). However, the alternative fit indices, which are less sensitive to sample size, confirmed the robustness of the model: both the CFI = 0.959 and the TLI = 0.961, exceeded the recommended threshold of 0.95. Furthermore, the RMSEA was 0.035 (90% CI: 0.030–0.040) and the SRMR was 0.050, satisfying the stringent criteria for good fit. The excellent fit of the measurement model indicates that perceived disorder, fear of crime, avoidance behaviors, satisfaction, and safety are empirically distinct yet coherently measured constructs, providing a robust foundation for testing the hypothesized structural relationships.

Reliability and validity measures for the four latent constructs are presented in Table 1. Internal consistency was high across all dimensions, with CR values ranging from 0.870 to 0.954. Convergent validity was also established, as the AVE for all constructs exceeded the 0.50 benchmark.

An examination of the standardized factor loadings reveals distinct hierarchies in user perceptions:

Perceived Disorder: The construct is predominantly defined by social incivilities related to narcotics. The indicators for drug dealing and drug use showed the highest loadings ($\lambda = 0.88$), followed by alcohol abuse ($\lambda = 0.87$). While physical incivilities such as illegal vehicle transit ($\lambda = 0.51$) contribute to the overall sense of disorder, they are secondary to the distress caused by substance-related behaviors.

Fear of Crime: This construct manifests primarily through spatial avoidance. The indicator regarding the avoidance of specific zones ($\lambda = 0.92$) contributed more strongly than temporal avoidance ($\lambda = 0.83$), suggesting that insecurity in the Cascine Park is highly territorialized.

Table 1. Psychometric properties of the measurement model.

Latent Construct	Indicator	Std. Loading (λ)	CR	AVE
Perceived Disorder	Drug Dealing	0.88	0.910	0.565
	Drug Use	0.88		
	Alcohol Abuse	0.87		
	Vandalism	0.77		
	Prostitution	0.62		
	Homelessness	0.77		
	Illegal Vehicles	0.51		
	Noise	0.62		
Fear of Crime	Avoid Zones	0.92	0.870	0.770
	Avoid Night	0.83		
Avoidance Behaviors	Avoid Visit	0.80	0.882	0.557
	Avoid Time	0.84		
	Avoid Alone	0.75		
	Change Route	0.68		
	Avoid Valuables	0.67		
	Defensive Behavior	0.72		
Service Satisfaction	Cleanliness	0.86	0.954	0.675
	Greenery	0.85		
	Lighting	0.73		
	Traffic Safety	0.86		
	Playgrounds	0.82		
	Dog Areas	0.80		
	Furniture	0.83		
	Public Transport	0.75		
	Accessibility	0.84		
	Mixed Use	0.82		

Note: All factor loadings are significant at $p < 0.001$.

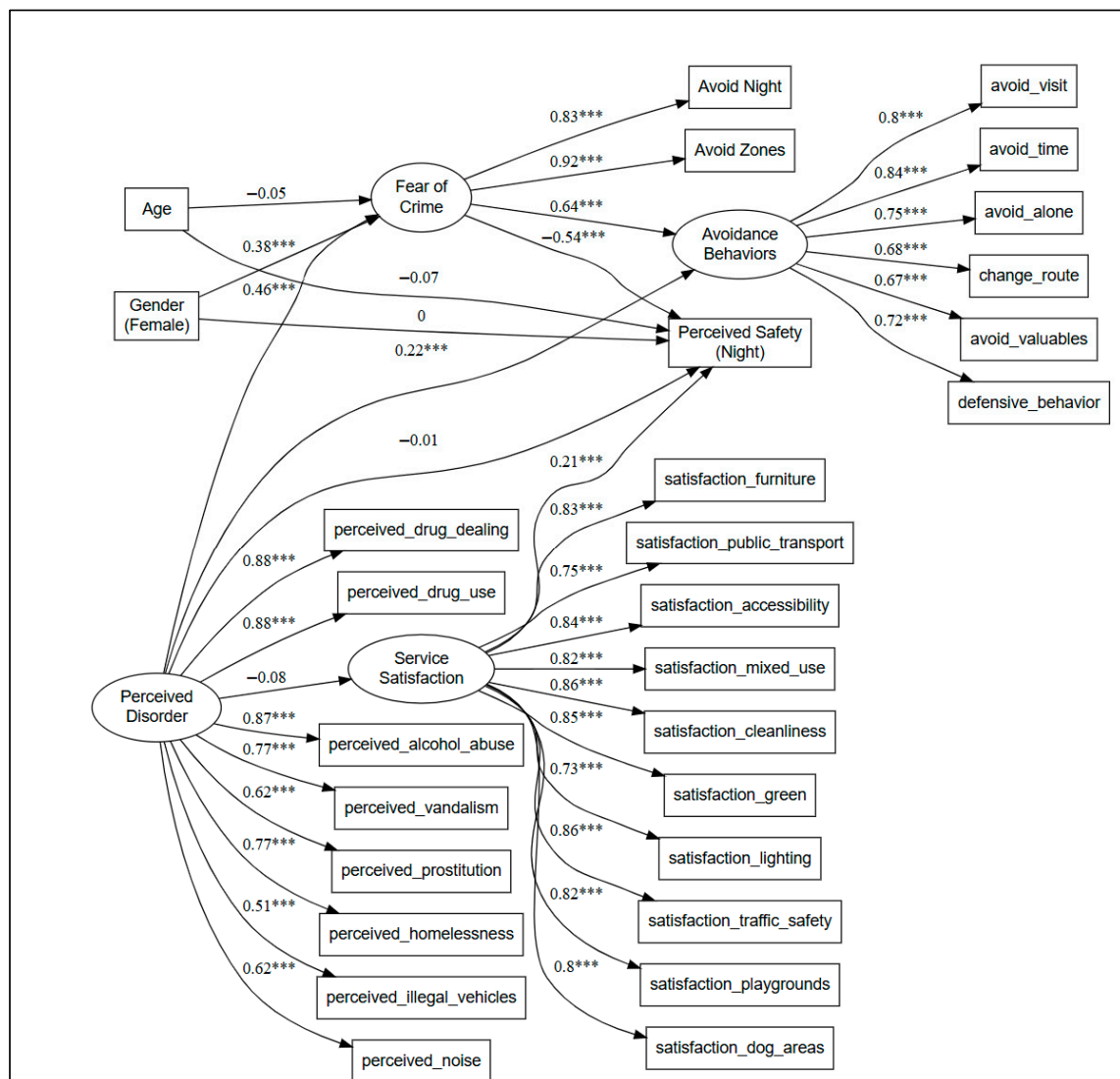
Service Satisfaction: Users conceptualize satisfaction holistically. High loadings were observed for cleanliness ($\lambda = 0.86$), traffic safety ($\lambda = 0.86$), and accessibility ($\lambda = 0.86$), indicating that maintenance and basic usability are as critical as specific amenities like playgrounds or lighting.

3.2. Structural Relationships and Drivers of Safety

The results of the structural equation model are reported in Table 2 and visually summarized in Figure 4, which displays the standardized path coefficients (β) and the explained variance (R^2) of the endogenous constructs. Overall, the model accounts for a substantial proportion of variance in both Avoidance Behaviors ($R^2 = 57.7\%$) and Perceived Nighttime Safety ($R^2 = 35.1\%$) indicating strong explanatory power.

Table 2. Structural regression results (Standardized Coefficients).

Path (Outcome ← Predictor)	β (Std.)	S.E.	z-Value	p-Value	Result
Fear of Crime					
← Perceived Disorder					
← Gender (Female)	0.462	0.083	6.899	<0.001	Supported
Avoidance Behaviors					
← Fear of Crime	0.378	0.151	6.268	<0.001	Sig.
← Perceived Disorder	0.635	0.113	6.915	<0.001	Supported
Nighttime Safety					
← Fear of Crime	0.216	0.082	4.073	<0.001	Supported
← Service Satisfaction	−0.536	0.078	−10.831	<0.001	Supported
← Perceived Disorder	0.213	0.061	6.850	<0.001	Supported

**Figure 4.** Path diagram of the Structural Equation Model visualizing the significant relationships between latent constructions. The graph was generated using the lavaanPlot package in R. Arrows indicate the direction of influence; path coefficients represent standardized regression weights (β). *** $p < 0.001$.

The Cascade Effect: Disorder, Fear, and Avoidance. As shown in Table 2 and illustrated in Figure 4, the analysis confirms a clear sequential mechanism linking environmental conditions to behavioral responses. Perceived Disorder exerts a strong and statistically significant effect on Fear of Crime ($\beta = 0.462$, $p < 0.001$) indicating that visible signs of social and physical incivilities constitute a primary trigger of emotional insecurity. In turn, Fear emerges as the main determinant of Avoidance Behaviors ($\beta = 0.635$, $p < 0.001$), explaining a large share of their variance ($R^2 = 57.7\%$). This finding suggests that users' behavioral adaptations—such as avoiding specific areas, changing routes, or refraining from visiting the park alone—are predominantly driven by emotional responses rather than by direct reactions to environmental conditions alone.

While Perceived Disorder also shows a significant direct effect on avoidance ($\beta = 0.216$, $p < 0.001$), the magnitude of the indirect pathway mediated by Fear of Crime is substantially stronger, confirming the presence of a pronounced fear-mediated cascade effect. This suggests that users modify their habits (e.g., changing routes, avoiding the park alone) mainly as an emotional response to perceived threats rather than simply due to environmental annoyance.

Determinants of Nighttime Safety and Mediation Effects. The regression results for Perceived Nighttime Safety, reported in Table 2, reveal the interplay of two opposing mechanisms. Fear of Crime exerts a strong negative impact on perceived safety ($\beta = -0.536$, $p < 0.001$), representing the primary factor undermining users' sense of security during nighttime hours. Conversely, Service Satisfaction plays a crucial mitigating role: higher satisfaction with park maintenance, accessibility, and amenities is associated with higher perceived nighttime safety ($\beta = 0.213$, $p < 0.001$). A key finding of this model is the full mediation of the effect of Perceived Disorder on Nighttime Safety. As shown in Table 2, the direct path from Perceived Disorder to Nighttime Safety is not statistically significant ($\beta = -0.011$, $p = 0.798$). This indicates that disorder related cues—such as litter, vandalism, or drug use—do not directly lower safety evaluations; instead, their impact operates entirely through the generation of Fear of Crime, as illustrated in Figure 4. If the disorder does not trigger fear in a specific user, it does not significantly degrade their safety perception.

Demographic Controls. Regarding the control variables included in the model (Table 2), Gender shows a significant positive effect on Fear of Crime, with female users reporting higher fear levels than males ($\beta = 0.378$, $p < 0.001$). However, gender did not directly predict Nighttime Safety ($p = 0.995$) once fear was controlled for. This indicates that the gender gap in safety perception is entirely mediated by the differential emotional response (fear) to the environment. Age did not show significant effects on either Fear or Perceived Nighttime Safety within the specified model.

4. Discussion

The present study aimed to decode the complex mechanisms underlying safety perception in the Cascine Park, employing a Structural Equation Modeling approach to disentangle the interplay between perceived social and physical disorder, emotional responses, and behavioral adaptations. The results provide empirical evidence that not only supports but also refines existing theories in urban sociology and environmental psychology, by demonstrating that safety perceptions in large urban green spaces are primarily shaped by socially driven forms of disorder and their emotional mediation through fear, rather than by environmental conditions alone, and offering targeted insights for the management of large urban green spaces.

4.1. Theoretical Insights: The Mediation of Fear and the Hierarchy of Disorder

While the structural analysis largely corroborates the behavioral pathways described by the “Broken Windows Theory” and the “Incivilities Thesis” [26,40], confirming that perceived signs of disorder trigger a reaction of withdrawal and fear, this framework requires critical sociological contextualization. Rather than implying a direct, objective, and deterministic relationship between environmental decay and perceived insecurity, this research provides a more nuanced theoretical interpretation of the underlying mechanism. While early ecological studies often modeled disorder as a direct predictor of neighborhood decline, our findings reveal a mechanism of full mediation. Perceived disorder does not degrade safety ratings directly; instead, it operates exclusively through the activation of Fear of Crime. This distinction is theoretically significant as it implies that the physical environment is not evaluated cognitively as “unsafe” per se, but rather interpreted through a socially mediated emotional response as “frightening.” In this sense, disorder functions less as a material condition and more as a social signal, indicating the perceived weakening of informal guardianship and the erosion of shared norms [29]. Crucially, from a critical sociology perspective, the definition of what constitutes “disorder” or a violation of these “shared norms” is inherently socially constructed and frequently reflects middle-class normative preferences. Treating public space usage—and the presence of structural disadvantages such as homelessness—solely through the lens of normative disorder touches directly upon issues of class conflict and spatial equity. Therefore, our mathematical model does not validate the objective reality of these normative claims, nor does it support exclusionary urban practices. Rather, it strictly maps the subjective, socially conditioned psychological process through which a specific user base translates visual cues into spatial fear.

Crucially, interpreting disorder as a “social signal” aligns with contemporary sociological critiques [27,28]. What users perceive as a signal of “failed social control” is not an objective metric of criminality, but a socially constructed perception. Behaviors or conditions often labeled as “incivilities”—such as the presence of homeless individuals—are filtered through the observer’s cultural lens. Therefore, our model does not validate the normative claims of traditional Broken Windows policing—which has historically risked stigmatizing marginalized populations—but rather strictly maps the subjective, psychological process by which users translate visual environmental cues into spatial fear.

A granular examination of the “Perceived Disorder” construct highlights that incivilities differ markedly in their psychological salience. In the Cascine Park, social incivilities—specifically drug dealing and use—exert a substantially stronger influence than physical signs of decay such as vandalism or noise. This hierarchy suggests that users are particularly sensitive to cues associated with human agency and behavioral unpredictability, which are perceived as more threatening than static forms of physical disorder. This finding aligns with recent advancements in environmental psychology indicating that social incivilities are especially distressing because they imply the presence of unpredictable or uncontrollable social interactions, whereas physical decay remains largely inert [41]. The strong “territorialization” of fear found in our CFA, where avoidance is linked to specific zones rather than general temporal anxiety, supports the “Hotspot” theory of victimization risk [42], suggesting that users have a sophisticated mental map of the park where danger is spatially localized. Such territorialized fear is likely reinforced by shared narratives and reputational processes, leading to the concentration of avoidance behaviors in specific areas. This finding underscores that perceived insecurity in large urban parks is not only an environmental issue, but also a product of social dynamics and place-based governance failures, with important implications for theory and urban management.

4.2. Environmental Buffers and Demographic Determinants

A significant contribution of this study to the field of urban management is the empirical quantification of the protective role of Service Satisfaction. Contrary to the reductionist assumption that safety is solely determined by crime rates or policing, our model demonstrates that high-quality maintenance, cleanliness, and accessibility can partially mitigate the negative effects of fear. Importantly, this buffering effect does not neutralize socially driven disorder but rather attenuates its consequences by signaling active management and social regulation of space.

This finding empirically validates the principles of Second-Generation CPTED, which emphasizes the role of management, social control, and collective responsibility over purely physical target hardening [43]. In our context, visible “care” manifested as clean paths, well-kept greenery, and lighting—is likely interpreted by users not merely as an aesthetic improvement, but as a proxy for both formal and informal surveillance. This suggests that investment in ordinary maintenance is not only a design-related intervention, but constitutes an active and socially meaningful safety policy.

Regarding demographic determinants, the study confirms the persistent gender gap in fear levels, consistent with the “Shadow of Sexual Assault” hypothesis [44]. Women reported significantly higher levels of fear compared to men; however, the structural model clarifies that gender does not bias the final safety assessment once the emotional level of fear is controlled for. This indicates that gender differences in perceived safety are fully mediated by fear, suggesting that the lower sense of safety among women reflects socially learned and context-dependent defensive responses to environmental and social cues, rather than a biased cognitive judgment. Conversely, age did not emerge as a significant predictor in our model, a finding that challenges some traditional victimological assumptions but aligns with recent research on park usage, where the physical ability to flee (fight-or-flight response) may be less relevant than the overall perception of ambient risk [12]. Taken together, these results suggest that demographic differences in safety perception are best understood through their interaction with socially mediated fear processes, rather than as direct effects of individual characteristics.

4.3. Macro-Level Challenges in Urban Park Design and Safety Perception

The relationship between perceived disorder, fear of crime, and park avoidance must be understood within the broader, complex context of urban planning and socio-economic dynamics. Previous studies have highlighted the multidimensional challenges of designing and maintaining urban green spaces, noting that user perception and the overall impact of parks are significantly influenced by diverse macro-level factors, ranging from climatic and geographic conditions to specific design strategies [45]. Furthermore, our findings align with the established understanding that local safety perceptions do not exist in a vacuum; they are inextricably linked to broader socio-economic determinants—such as poverty and employment dynamics—which drive baseline crime rates and shape community vulnerabilities [46]. Ultimately, these factors dictate how users value public spaces. As demonstrated in other international contexts, the successful management of perceived safety is a fundamental prerequisite for enhancing visitor preferences and the overall recreational value of urban parks [47].

4.4. Limitations and Future Research Directions

Despite the robustness of the statistical model, this study is subject to limitations that necessarily delimit the interpretation of these findings. Primarily, the reliance on a non-probabilistic snowball sampling technique introduces the risk of self-selection bias. While this mixed-mode approach (CAWI and flyers) was necessary to maximize reach

across the park's vast and fluid user base, it may have led to the overrepresentation of specific demographic segments—such as younger individuals or those highly engaged in neighborhood digital networks—while underrepresenting elderly users or non-residents. Crucially, from a critical sociology perspective, this survey methodology structurally fails to capture the voices of marginalized individuals or those who might be classified as the “creators” of such disorder (e.g., the homeless, or those engaged in illicit activities). Therefore, it must be explicitly acknowledged that our data does not represent an impartial, equitable cross-section of all individuals physically present in the park, but rather reflects the socially conditioned perceptions of a predominantly normative, digitally active public. Consequently, the true representativeness of our sample compared to the actual daily park population remains unknown. Therefore, while the structural relationships identified by the SEM (i.e., the pathways linking disorder, fear, and avoidance) provide robust theoretical insights into psychological mechanisms, the absolute descriptive statistics—such as the exact prevalence of fear or spatial avoidance—should not be deterministically generalized to the entire metropolitan population.

Second, the cross-sectional design precludes the establishment of strict causal inference. While SEM allows for the testing of theory-driven directional hypotheses, reciprocal effects cannot be ruled out; for instance, users with higher trait anxiety or prior victimization experiences might be more vigilant and thus more likely to interpret environmental and social cues as disorder than others.

This limitation is particularly relevant given the socially mediated nature of fear identified in the model.

The reliance on an online survey may have introduced a self-selection bias, potentially underrepresenting marginalized populations, socially excluded groups, or elderly users with lower digital literacy, whose perception of the park might differ from that of the more active and digitally connected population. Given that perceptions of disorder and safety are socially constructed, such underrepresentation may lead to a partial depiction of the full spectrum of user experiences.

Furthermore, the study focused exclusively on perceived safety and perceived disorder, without correlating these subjective measures with official crime statistics or police-recorded incidents. Consequently, we discuss the “feeling of insecurity,” which constitutes distinct sociological phenomenon from the objective risk of victimization. While this focus is theoretically justified, it limits the ability to assess potential mismatches between perceived and actual risk. These limitations open several avenues for future research.

To address the causality issue and the temporal dynamics of fear formation, future studies should employ longitudinal or panel designs allowing for the observation of how changes in environmental conditions or social regulation affect perceptions over time.

A pre-post evaluation following specific urban regeneration or management interventions—such as the installation of adaptive lighting, the reorganization of functional and social spaces, or the introduction of targeted social surveillance measures—would allow for the assessment of structural changes in the causal pathways identified in this study.

Additionally, to overcome the recall bias inherent in retrospective questionnaires, future investigations could integrate Participatory GIS (PGIS), mobile sensing, or experience sampling methodologies. Allowing users to report disorder, fear, or avoidance in real-time while navigating the park would provide a more granular spatial understanding of “fear hotspots,” distinguishing between areas that are objectively risk, socially stigmatized, or that merely evoke fear due to poor design, weak management, or reputational effects. Finally, integrating qualitative and mixed-method approaches, such as walking interviews, ethnographic observation, or in-depth interviews with specific user groups, would deepen the understanding social meanings and situational cues that signal “safety” or “danger”

to different demographic groups. Such approaches are essential to complement quantitative modeling and to inform more inclusive, socially sensitive urban planning and park governance strategies.

4.5. Policy Implications: From Data to Park Management

The findings of this study extend beyond theoretical contribution, offering granular and empirically grounded guidelines for the planning and management of the Cascine Park. By synthesizing the hierarchical priorities emerging from the Confirmatory Factor Analysis (Table 1) with the causal mechanisms identified by the Structural Equation Model (Table 2; Figure 4), it is possible to derive an integrated and actionable strategy for intervention, directly aligned with users' perceptions and behaviors.

- **Prioritizing Interventions: Insights from User Perception.** The hierarchy of perceptions revealed by the CFA dictates a clear and evidence-based prioritization of resources. First, the dominance of social incivilities (drug dealing, $\lambda = 0.88$) over physical ones implies that strategies focused solely on purely cosmetic or surface-level interventions—such as removing graffiti—will be insufficient if the social environment remains unpredictable and weakly regulated. Park management must therefore prioritize active social control mechanisms and “soft” interventions (e.g., cultural programming, supervised activities, increased legitimate presence) aimed at re-establishing normative uses of space and displacing illicit practices. Second, the finding that Fear of Crime is predominantly spatial ($\lambda = 0.92$) suggests that insecurity is anchored to specific and recurrent “hotspots” rather than being a diffuse atmospheric condition. Consequently, security policies should adopt a targeted, place-based approach, concentrating resources on these nodes through localized CPTED interventions (e.g., adaptive lighting, pruning undergrowth, improving sightlines) rather than dispersing resources uniformly across the park. Such spatial precision increases both the efficiency and the perceptual impact of interventions.
- **Breaking the “Fear Loop”:** Insights from Structural Pathways. The structural relationships identified by the SEM provide critical guidance on how and why these interventions should be implemented. The observed “cascade effect”, whereby disorder triggers avoidance almost exclusively through fear, and the finding of full mediation, have direct operational implications. Since disorder does not degrade safety perception directly but only when it successfully instills fear, urban design and management strategies must prioritize emotional reassurance alongside physical remediation.
- **It is therefore insufficient to simply remove signs of disorder; interventions must be visible, legible, and socially communicative in order to effectively lower users' anxiety thresholds.** For instance, replacing a broken fence (reducing physical disorder) may have less impact on perceived safety than improving visual permeability, enhancing escape routes, or installing emergency call stations, which directly address the fear-generating properties of space.
- **Maintenance as an Active Security Strategy.** The structural model identifies Service Satisfaction as a crucial opposing force to fear ($\beta = 0.213$), empirically validating the concept of “Care as Control”. High-quality maintenance is interpreted by users not merely as aesthetic enhancement, but as a signal of guardianship, institutional presence, and ongoing oversight. For park administrators, this elevates routine operations—such as waste removal, greenery management, lighting upkeep and transport accessibility—from background maintenance tasks to strategic components of urban safety policy. Investing in the functionality, cleanliness, and usability of the park is therefore not ancillary to security objectives; rather, it constitutes a preventive

strategy capable of buffering the negative psychological effects of environmental and social stressors.

- **Gender-Responsive Planning.** The analysis of demographic controls highlights the necessity of gender-sensitive urban planning. The finding that the gender gap in safety perception is entirely mediated by fear suggests that women are not assessing risk differently from men, but are more strongly affected by environmental fear triggers. Planning interventions should therefore explicitly address these triggers—such as poor lighting, entrapment spots, visual obstructions and limited escape routes—to democratize access and use of the park across genders. Reducing these specific stressors represents a structurally effective way to narrow gender disparities in perceived safety, without resorting to paternalistic or exclusionary design solutions.
- **Methodological Scalability.** Beyond the local context, this research demonstrates the value of a rigorous, data-driven analytical workflow for urban governance. The pipeline employed here—structured survey → CFA validation → SEM causal testing—constitutes a scalable diagnostic framework for identifying the psychological mechanisms that link space, behavior, and perception. Unlike traditional descriptive surveys, this approach enables administrators to move beyond anecdotal evidence, pinpointing the specific environmental and social levers that drive avoidance and insecurity. As such, the proposed protocol offers a transferable model for “evidence-based urban design” and park management, allowing cities to tailor regeneration and governance strategies to the verified socio-psychological dynamics of their users, rather than relying on generalized or reactive security measures.

4.6. Policy Priorities Box—Evidence-Based Actions for Urban Park Governance

- **Priority 1—Address social disorder as the primary driver of fear of crime:** The most effective strategy to reduce fear and improve perceived safety is the credible and sustained reduction in social disorder, particularly drug dealing, drug use, and predatory behaviors. Given their dominant role in the disorder construct and their indirect but decisive effect on perceived safety through fear, these phenomena must be treated as core urban safety and planning issues rather than marginal social problems [7,41,48,49]. Crucially, however, addressing these issues requires profound ethical care. Urban governance must clearly distinguish between behaviors that objectively threaten safety (e.g., predatory crimes and aggressive drug dealing) and the mere presence of marginalized individuals (e.g., homelessness). Interventions must strictly target illicit activities without resorting to the social and spatial exclusion of vulnerable populations. Policies should avoid zero-tolerance policing that criminalizes poverty, focusing instead on integrated approaches that combine safety enforcement with social welfare and public health services.
- **Priority 2—Place-based enforcement targeting fear hotspots:** Fear and avoidance are spatially concentrated. Governance actions should therefore focus on specific zones and time periods perceived by users as unsafe, through targeted patrols, coordinated police presence, and repeated interventions that disrupt illicit routines rather than diffuse or symbolic control [50,51].
- **Priority 3—Integrated governance: enforcement, management, and welfare:** Reducing social disorder requires a coordinated approach combining law enforcement, continuous park management and guardianship, and social and health services, in order to address underlying vulnerabilities and avoid simple spatial displacement of the problem [48,50,52].
- **Priority 4—Reduce opportunities for illicit activities through design and management:** Urban design and park management should actively reduce the ease and invisibility

of illegal activities by improving sightlines, limiting concealment, managing access points, and ensuring the legibility and supervision of pathways and nodes [6,53,54].

- Priority 5—Re-establish legitimate activities as a mechanism of social control: The provision of supervised cultural, recreational, and sporting activities—especially during late afternoon and evening hours—helps restore legitimate use of space, strengthens informal social control, and counteracts fear-driven avoidance [11,41,55].

5. Conclusions

This study provides empirical evidence that, within the specific context of the Cascine Park, perceived social disorder—predominantly defined by drug dealing and substance use—acts as the central psychological trigger for fear of crime. The structural analysis reveals a hierarchy of concerns where unpredictable social behaviors weigh significantly more on user perception than static physical decay ($\lambda_{\text{social}} > \lambda_{\text{physical}}$).

Crucially, the identification of a full mediation mechanism clarifies that disorder does not degrade perceived safety directly, but exclusively by instilling fear. This suggests that the user's evaluation of the park is emotionally driven rather than purely cognitive. However, contrary to a purely fatalistic view of the “Broken Windows” theory, our results demonstrate that Service Satisfaction exerts a significant, independent positive effect on perceived safety. This implies that while visible social disorder is a potent detractor, high-quality park management (cleanliness, accessibility, lighting) functions as a vital protective buffer, partially counteracting the anxiety generated by the environment.

Therefore, we conclude that effective safety policies for large metropolitan parks cannot rely on a single lever. A “dual-track” strategy is required: on one hand, active social control to displace the specific behaviors that trigger the fear response (drug-related incivilities); on the other, consistent environmental maintenance to signal guardianship and care. Neglecting the former leaves the “fear loop” active, while neglecting the latter removes the only tool capable of mitigating that fear for the everyday user [7,26,41,48,49].

Furthermore, the findings highlight the compensatory function of Service Satisfaction. While elements such as cleanliness, accessibility, and usability significantly enhance perceived safety, their positive influence is quantitatively outweighed by the intense negative impact of Fear of Crime (as indicated by the standardized coefficients). This suggests that high-quality maintenance acts as a vital protective factor, yet it cannot fully neutralize the distress caused by social incivilities. This dynamic is particularly critical regarding gender equity: since female users report significantly higher baseline levels of fear, the persistence of social disorder acts as a disproportionate barrier to their use of the park. Thus, mitigating social disorder is not merely a matter of public order, but a prerequisite for ensuring equal spatial accessibility [11,52,55]. Overall, the results suggest that policies focusing exclusively on physical upgrades or routine surveillance may have limited effectiveness unless embedded within a comprehensive, place-based strategy aimed at reducing social disorder and restoring predictable, rule-governed use of public space.

Supplementary Materials: The following supporting information can be downloaded at <https://www.mdpi.com/article/10.3390/urbansci10030170/s1>, Questionnaire form, Database.

Author Contributions: Conceptualization, C.F., M.A., G.C., N.M. and F.O.; methodology, C.F.; software, I.B.; validation, I.B. and C.F.; formal analysis, I.B.; data curation, M.A., G.C., N.M. and F.O.; writing—original draft preparation, I.B.; writing—review and editing, I.B. and C.F.; supervision, C.F. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki. Ethical review and approval were not required for this study because it was a minimal-risk, anonymous, non-interventional survey on adult participants with no collection of directly identifiable personal data. Data processing complied with Regulation (EU) 2016/679 (GDPR) and the Italian Privacy Code (D.Lgs. 196/2003, as amended by D.Lgs. 101/2018). The study does not fall within the scope of EU/Italian clinical trial legislation requiring ethics committee approval for interventional biomedical research (e.g., Regulation (EU) No 536/2014; D.Lgs. 14 May 2019, n. 52).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Prior to participation, respondents were presented with a digital information sheet detailing the study's non-commercial, academic, and research objectives. Participants were explicitly informed that the data collection was strictly anonymous, that no personally identifiable information would be shared with third parties, and that all results would be analyzed and published exclusively in an aggregated format. By voluntarily proceeding with the questionnaire, participants acknowledged having read the privacy notice and formally provided their explicit consent to data processing, in full compliance with the European General Data Protection Regulation (GDPR, Regulation (EU) 2016/679) and the Italian Privacy Code (Legislative Decree 196/2003, as amended by Legislative Decree 101/2018).

Data Availability Statement: The original data presented in the study are openly available in Supplementary Materials.

Acknowledgments: During the preparation of this manuscript, the authors used Gemini Pro V.3.1 for the purposes of English translation help. The authors have reviewed and edited the output and take full responsibility for the content of this publication. Moreover, the authors gratefully acknowledge the administrators of the social media page *Welcome to Florence* (https://www.instagram.com/welcome_to_florence?igsh=MWU4bTd0cWhyb2g0bg==, accessed on 29 November 2025) for allowing the dissemination of the questionnaire through their social channel, which significantly contributed to reaching a broad and diverse sample of respondents.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

AVE	Average Variance Extracted
CAWI	Computer-Assisted Web Interviewing
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CR	Composite Reliability
CPTED	Crime Prevention Through Environmental Design
DWLS	Diagonally Weighted Least Squares
GDPR	General Data Protection Regulation
PGIS	Participatory Geographic Information Systems
PLS-SEM	Partial Least Squares Structural Equation Modeling
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modeling
SRMR	Standardized Root Mean Square Residual
TLI	Tucker–Lewis Index
WLSMV	Weighted Least Squares Mean and Variance Adjusted

References

1. Maruthaveeran, S.; van den Bosch, C.C. A Socio-Ecological Exploration of Fear of Crime in Urban Green Spaces: A Systematic Review. *Urban For. Urban Green.* **2014**, *13*, 1–18.
2. Jacobs, J. *The Death and Life of Great American Cities*; Random House: New York, NY, USA, 1961.

3. Loukaitou-Sideris, A. Hot Spots of Bus Stop Crime: The Importance of Environmental Attributes. *J. Am. Plan. Assoc.* **2007**, *65*, 395–411. [[CrossRef](#)]
4. Pain, R. Place, Social Relations and the Fear of Crime: A Review. *Prog. Hum. Geogr.* **2000**, *24*, 365–387. [[CrossRef](#)]
5. Navarrete-Hernandez, P.; Luneke, A.; Truffello, R.; Fuentes, L. Planning for Fear of Crime Reduction: Assessing the Impact of Public Space Regeneration on Safety Perceptions in Deprived Neighborhoods. *Landsc. Urban Plan.* **2023**, *237*, 104809. [[CrossRef](#)]
6. Nasar, J.L.; Fisher, B.; Grannis, M. Proximate Physical Cues to Fear of Crime. *Landsc. Urban Plan.* **1993**, *26*, 161–178. [[CrossRef](#)]
7. Skogan, W.G. *Disorder and Decline: Crime and the Spiral of Decay in American Neighborhoods*; Sage Communications in Society; University of California Press: Oakland, CA, USA, 1990.
8. Ceccato, V.; Uittenbogaard, A.C. Space–Time Dynamics of Crime in Transport Nodes. *Ann. Assoc. Am. Geogr.* **2014**, *104*, 131–150. [[CrossRef](#)]
9. Camacho Doyle, M.; Gerell, M.; Andershed, H. Perceived Unsafety and Fear of Crime: The Role of Violent and Property Crime, Neighborhood Characteristics, and Prior Perceived Unsafety and Fear of Crime. *Deviant Behav.* **2022**, *43*, 1347–1365. [[CrossRef](#)]
10. Sampson, R.J.; Raudenbush, S.W. Systematic Social Observation of Public Spaces: A New Look at Disorder in Urban Neighborhoods. *Am. J. Sociol.* **1999**, *105*, 603–651. [[CrossRef](#)]
11. Chen, X.; Marzbali, M.H. How Urban Park Features Impact Perceived Safety by Considering the Role of Time Spent in the Park, Gender, and Parental Status. *Cities* **2024**, *153*, 105272. [[CrossRef](#)]
12. Bogar, S.; Beyer, K.M. Green space, violence, and crime: A systematic review. *Trauma Violence Abus.* **2016**, *17*, 160–171. [[CrossRef](#)]
13. Kahila-Tani, M.; Broberg, A.; Kyttä, M.; Tyger, T. Let the Citizens Map—Public Participation GIS as a Planning Support System in the Helsinki Master Plan Process. *Plan. Pract. Res.* **2016**, *31*, 195–214. [[CrossRef](#)]
14. Kahila-Tani, M.; Kyttä, M.; Geertman, S. Does Mapping Improve Public Participation? Exploring the Pros and Cons of Using Public Participation GIS in Urban Planning Practices. *Landsc. Urban Plan.* **2019**, *186*, 45–55. [[CrossRef](#)]
15. Perkins, D.D.; Florin, P.; Rich, R.C.; Wandersman, A.; Chavis, D.M. Participation and the Social and Physical Environment of Residential Blocks: Crime and Community Context. *Am. J. Community Psychol.* **1990**, *18*, 83–115. [[CrossRef](#)]
16. Newman, O. *Defensible Space: Crime Prevention Through Urban Design*; Macmillan Publishing: New York, NY, USA, 1973.
17. Iqbal, A.; Ceccato, V. Is CPTED Useful to Guide the Inventory of Safety in Parks? A Study Case in Stockholm, Sweden. *Int. Crim. Justice Rev.* **2016**, *26*, 150–168. [[CrossRef](#)]
18. Mak, B.K.L.; Jim, C.Y. Examining Fear-Evoking Factors in Urban Parks in Hong Kong. *Landsc. Urban Plan.* **2018**, *171*, 42–56. [[CrossRef](#)]
19. Jorgensen, A.; Hitchmough, J.; Calvert, T. Woodland Spaces and Edges: Their Impact on Perception of Safety and Preference. *Landsc. Urban Plan.* **2002**, *60*, 135–150. [[CrossRef](#)]
20. Chen, X.; Hedayati Marzbali, M.; Armitage, R. Perceived Safety in Urban Parks: CPTED, Place Attachment and the COVID-19 Paradigm. *Environ. Dev. Sustain.* **2025**, 1–26. [[CrossRef](#)]
21. Mansouri Kermani, Z.; Pazhouhanfar, M.; Mustafa Kamal, M.S. Role of Esthetic Judgment on Perceived Safety of Urban Parks' Users. *Secur. J.* **2022**, *35*, 1263–1287. [[CrossRef](#)]
22. Türkseven Doğrusoy, I.; Zengel, R. Analysis of Perceived Safety in Urban Parks: A Field Study in Büyükşehir and Hasanağa Park. *METU J. Fac. Archit.* **2017**, *34*, 63–84. [[CrossRef](#)]
23. Pérez-Tejera, F.; Anguera, M.T.; Guàrdia-Olmos, J.; Dalmau-Bueno, A.; Valera, S. Examining Perceived Safety and Park Use in Public Open Spaces: The Case of Barcelona. *J. Environ. Psychol.* **2022**, *81*, 101823. [[CrossRef](#)]
24. Dillman, D.A.; Smyth, J.D.; Christian, L.M. *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method*, 4th ed.; John Wiley & Sons, Inc.: Hoboken, NJ, USA, 2014.
25. Couper, M.P. Web Surveys: A Review of Issues and Approaches. *Public Opin. Q.* **2000**, *64*, 464–494. [[CrossRef](#)]
26. Wilson, J.Q.; Kelling, G.L. Broken Windows: The Police and Neighborhood Safety. *Atl. Mon.* **1982**, *249*, 29–38.
27. Sampson, R.J.; Raudenbush, S.W. Seeing Disorder: Neighborhood Stigma and the Social Construction of “Broken Windows”. *Soc. Psychol. Q.* **2004**, *67*, 319–342. [[CrossRef](#)]
28. Harcourt, B.E. *Illusion of Order: The False Promise of Broken Windows Policing*/Bernard E. Harcourt; Harvard University Press: Cambridge, MA, USA, 2001.
29. Ferraro, K.F. *Fear of Crime: Interpreting Victimization Risk*; SUNY Press: New York, NY, USA, 1995.
30. Ferraro, K.F.; Grange, R.L. The Measurement of Fear of Crime*. *Sociol. Inq.* **1987**, *57*, 70–97. [[CrossRef](#)]
31. Farrall, S.D.; Jackson, J.; Gray, E. *Social Order and the Fear of Crime in Contemporary Times*; Oxford University Press: Oxford, UK, 2009.
32. Chiesura, A. The Role of Urban Parks for the Sustainable City. *Landsc. Urban Plan.* **2004**, *68*, 129–138. [[CrossRef](#)]
33. Lorenc, T.; Petticrew, M.; Whitehead, M.; Neary, D.; Clayton, S.; Wright, K.; Thomson, H.; Cummins, S.; Sowden, A.; Renton, A. Fear of Crime and the Environment: Systematic Review of UK Qualitative Evidence. *BMC Public Health* **2013**, *13*, 496. [[CrossRef](#)]
34. The R Core Team. R: A Language and Environment for Statistical Computing 2024. Available online: <https://cran.rstudio.com/manuals.html> (accessed on 13 January 2026).

35. Rosseel, Y. Lavaan: An R Package for Structural Equation Modeling. *J. Stat. Softw.* **2012**, *48*, 1–36. [\[CrossRef\]](#)
36. Li, C.-H. Confirmatory Factor Analysis with Ordinal Data: Comparing Robust Maximum Likelihood and Diagonally Weighted Least Squares. *Behav. Res. Methods* **2016**, *48*, 936–949. [\[CrossRef\]](#) [\[PubMed\]](#)
37. Hu, L.T.; Bentler, P.M. Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria versus New Alternatives. *Struct. Equ. Model.* **2009**, *6*, 1–55. [\[CrossRef\]](#)
38. Fornell, C.; Larcker, D.F. Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *J. Mark. Res.* **1981**, *18*, 39–50. [\[CrossRef\]](#)
39. Hair, J.F.; Black, W.C.; Babin, B.J.; Anderson, R.E. *Multivariate Data Analysis*, 5th ed.; Cengage Learning: Boston, MA, USA, 2022.
40. Taylor, R.B. *Breaking Away from Broken Windows: Baltimore Neighborhoods and the Transformation of the Urban Grime, Crime, Fear, and Decline Debate*; Westview Press: Boulder, CO, USA, 2001.
41. LaGrange, R.L.; Ferraro, K.F.; Supancic, M. Perceived Risk and Fear of Crime: Role of Social and Physical Incivilities. *J. Res. Crime Delinq.* **1992**, *29*, 311–334. [\[CrossRef\]](#)
42. Sherman, L.W.; Gartin, P.R.; Buerger, M.E. Hot Spots of Predatory Crime: Routine Activities and the Criminology of Place. *Criminology* **1989**, *27*, 27–55. [\[CrossRef\]](#)
43. Cozens, P.M.; Saville, G.; Hillier, D. Crime Prevention through Environmental Design (CPTED): A Review and Modern Bibliography. *Prop. Manag.* **2005**, *23*, 328–356. [\[CrossRef\]](#)
44. Warr, M. Fear of Rape among Urban Women. *Soc. Probl.* **1985**, *32*, 238–250. [\[CrossRef\]](#)
45. El-Metwally, Y.; Elshater, A.; Fahmy, M.; Elrahman, A.S.A.; AlWaer, H.; Elbardisy, W.M. Assessing the Impact of Urban Parks across Köppen Climatic Zones: A Systematic Review. *Proc. Inst. Civ. Eng. Urban Des. Plan.* **2025**, *178*, 6–20. [\[CrossRef\]](#)
46. Sivakumar, T.; Raveendran, T.; Jayathilaka, R.; Wickramaarachchi, C.; Jayasuriya, N. Economic Growth, Poverty and Female Employment on Crime Rates at Global Level. *Crime Law Soc. Change* **2026**, *84*, 5. [\[CrossRef\]](#)
47. Endalamaw, T.B.; Girma, G.; Darr, B. Visitor Preferences and Willingness to Pay for Urban Recreation: The Case of Entoto Recreational Park in Addis Ababa, Ethiopia. *Discov. Sustain.* **2026**, *7*, 121. [\[CrossRef\]](#)
48. Braga, A.A.; Schnell, C.; Welsh, B.C. Welsh Disorder Policing to Reduce Crime: An Updated Systematic Review. *Criminol. Public Policy* **2024**, *23*, 745–775. [\[CrossRef\]](#)
49. Gobaud, A.N.; Jacobowitz, A.L.; Mehranbod, C.A.; Sprague, N.L.; Branas, C.C.; Morrison, C.N. Place-Based Interventions and the Epidemiology of Violence Prevention. *Curr. Epidemiol. Rep.* **2022**, *9*, 316–325. [\[CrossRef\]](#) [\[PubMed\]](#)
50. Braga, A.A.; Weisburd, D. The Effects of Focused Deterrence Strategies on Crime: A Systematic Review and Meta-Analysis. *J. Res. Crime Delinq.* **2012**, *49*, 323–358. [\[CrossRef\]](#)
51. Turchan, B.; Braga, A. The Effects of Hot Spots Policing on Violence: A Systematic Review and Meta-Analysis. *Aggress. Violent Behav.* **2024**, *79*, 102011. [\[CrossRef\]](#)
52. Ferraro, K.F. Women’s Fear of Victimization: Shadow of Sexual Assault? *Soc. Forces* **1996**, *75*, 667–690. [\[CrossRef\]](#)
53. Egea-Cariñanos, P.; Calaza-Martínez, P.; Roche Daniel, L.; Cariñanos, P. Uses, Attitudes and Perceptions of Urban Green Spaces According to the Sociodemographic Profile: An Exploratory Analysis in Spain. *Cities* **2024**, *150*, 104996. [\[CrossRef\]](#)
54. Cecere, L.; Grimaldi, M.; Lorusso, A.; Marra, A.; Stoia, F. Immersive Urban Planning: Evaluating Park Safety Perception with Digital Twins and Metaverse Simulation. *Sustainability* **2025**, *17*, 7608. [\[CrossRef\]](#)
55. Pain, R. Social Geographies of Women’s Fear of Crime. *Trans. Inst. Br. Geogr.* **1997**, *22*, 231–244.

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.