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The impact of physical incivility signs on perceived safety in informal settlements in Jordan

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Abstract

Feeling safe is essential to improve the social and psychological well-being of residents. Safety is often associated with various signs of incivility in neighborhoods in general and in informal settlements in specific; the latter has been rarely studied in the context of Jordan. Thus, the present research aims to identify physical incivility signs in informal settlements and explore their impact on perceived safety. To address this aim, the study utilized a mixed-method approach that included a content analysis of textual and oral documents, a qualitative analysis of 18 interviews, and a spatial analysis of field observations of the selected research setting (Janna'ah neighborhood in Zarqa, Jordan). The goal was to verify forms of physical incivility signs, including abandoned buildings, narrow alleys, poor lighting, litter, vandalism, graffiti, and abandoned cars. Moreover, a quantitative analysis of (487) responses obtained through structured questionnaires was conducted. The results showed that abandoned buildings, alleys, and poor lighting are significant physical incivility signs affecting perceived safety. feeling safe was also associated with residents' socio-economic attributes such as age, gender, and occupation.

Keywords Perceived safety, Informal settlement, Physical disorder, Physical incivility signs, Spatial analysis

Introduction

Community safety is one of the fundamental aspects directly impacting human well-being (Charlton & Mistry 2020). This is affirmed by Maslow (1943), who considers it a basic need after the main physiological ones (food, drink, etc.). Several other studies have discussed the concept of perceived safety and highlighted the impact of tangible and intangible factors on an individual's perceived safety (James et al., 2019). Much research has focused on tangible factors related to the physical condition of the built environment and the built environment's physical condition. For example, neighborhood residents can interpret the physical cues of deteriorated neighborhoods or incivility signs as an absence of protection or control. This could negatively impact the residents' sense of safety (Austin & Furr 2002; Austin et al. 2007; Spelman 2004).

Numerous studies have discussed the concept of incivility over the past decades. Many researchers have investigated the effect of physical incivility signs on people's perceived safety in different urban settings; nevertheless, studies that have examined its impact in the informal settlement are limited, especially in the context of Jordan. This issue has been prevalent in Western literature, while its implications in the Middle Eastern context are yet to be fully explored. Specifically, for the Jordanian context, the impacts of physical incivility signs on safety perception have not been investigated, to the best of the author's knowledge. Consequently, many questions remain unanswered, especially regarding whether, to what extent, and why these signs affect perceived safety in informal settlements. Therefore, the current research attempts to fill a

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gap in this field by exploring the effect of physical incivility signs on perceptions of safety in the context of informal settlements.

Literature review

Before delving into an investigation of incivility signs' role in the perceived safety of a neighborhood, it is significant to spell out the factors that lead individuals to feel safe. Defining keywords such as *"perceived safety"* and *"incivility signs"* will set the path for this research scope, focusing on the relationship between incivility signs and perceived safety.

Perceived safety

Safety is a general term that has been frequently used; it could be defined as the feeling of being protected against danger caused by or threatened to be caused by human actions in the public space and classified as "actual safety" and "perceived safety" (Boomsma & Steg 2014). Actual social safety is related to the actual crime rate; in other words, people may feel unsafe despite no real risks (Park et al. 2008). Perceived safety refers to the sense of security and an absence of anxiety about becoming victimized while moving through spaces (Van Schaik et al. 2012). Perceived safety is a complex, fluid issue that may vary from one person to another (Ladenburg et al. 2016). Previous studies emphasize the multidimensional nature of perceived safety, along with fear of crime, and its association with different variables: such as various demographic factors, previous victimization experiences, and the presence of physical and social incivility signs in the urban context (Allik & Kearns 2017; Austin & Furr 2002; Dastgheib 2018; Ladenburg et al. 2016). This theme has been receiving increasing attention in general and in the urban context in particular since it is associated with sustainable community and residents' well-being (Dastgheib 2018). Several researchers have argued that decreased perceived safety in urban settings causes increased fear of crime and of being a victim (Najafpour et al. 2014; Machielse 2015; Allik & Kearns 2017). Studying actual safety requires access to reports of crime rates for study areas. In Jordan's context, obtaining crime data as confidential information was challenging, and the available data were insufficient for the purpose of the study. Therefore, this study was limited to investigating perceived safety. To avoid bias, various research tools were used to assess perceived safety objectively. The vulnerability hypothesis assumes that perceived safety reflects the individuals' perception of their ability to defend themselves against attack or exposure to criminal assault (Allik & Kearns 2017). Therefore, individuals who are not confident in their ability to protect themselves fear crime more than others. This can be explained by the limited ability to defend themselves either because they are physically not strong enough to protect themselves, cannot manage to preserve their place, or need more time to recover after being harmed (Cabras et al. 2011). Based on this, demographic variables (gender, age, education, and socio-economic status) could help interpret perceptions about perceived safety (Allik & Kearns 2017). Also, previous victimization experiences can influence individuals' attitudes about fear of crime and perception of safety (Austin & Furr 2002). This is supported by previous studies that have proven the existence of a relationship between perceived safety and previous victimization experiences, as victims were naturally more afraid than non-victims (Garofalo & delinquency 1979). Being a victim of a previous crime contributes greatly to perceptions of insecurity in the neighborhood (Taub et al. 1981). Both direct victimization and contact with previous victims (indirect victimization) had a negative impact on crime-related attitudes and safety issues (Austin & Furr 2002). In contrast, other researchers have suggested that the actual impact of victimization was less than expected. In fact, Forde (1993) found that despite high crime rates in a neighborhood, the residents still walk alone in their neighborhood and feel safe. Therefore, it can be said that perceived safety is associated with individuals' socio-economic attributes as well as with quality of place in terms of physical, social, environmental, and economical aspects.

Incivility signs

Incivilities are tangible and intangible "signs of disorder characterized by the disorganized physical environment and the disorganized physical environment and disruptive social behaviors. This can be seen through street littering, graffiti, signs of vandalism, and disorder/deterioration of neighborhood's buildings" (Brown 2011). Incivility signs can indicate that the neighborhood is out of control and lacks order, which makes residents fear crime and feel insecure. Especially potential criminals are attracted to these places to engage in criminal activities (Austin et al. 2007; Spelman 2004). Effectively, incivility represents problems at the local level, and its impact may vary from place to place, where indicators may cause fear and dissatisfaction at different rates. This can be explained based on culturally accepted norms and values that differ from one culture to another. Therefore, identifying and measuring its impact must also consider these factors.

The relationship between physical incivility signs and perceived safety is cyclical: signs of incivility provide visual cues for potential criminal activity, which reduces people's perceived safety, and then leads to space avoidance along with more disorder (Foster et al.

2014; Snyders & Landman 2018). Therefore, the Broken Windows Theory suggests breaking this cycle, removing incivility signs, adding orders, and using security mechanisms such as video supervision, fences, and other "target hardening" strategies (Jiang et al. 2018; Cozens et al. 2013). This will improve perceptions of safety among community members (Charlton & Mistry 2020). It can be concluded that people avoid places where they feel they are in danger of becoming a victim. Moreover, potential offenders pick places with inadequate surveillance where they can easily commit crimes. Such environments with physical incivility are more common in deprived neighborhoods and informal settlements. Indeed, these unsafe places are considered incubators for anti-social activities and criminal behaviors (Omoboye & Festus 2020).

Social Disorganization theory is a prominent theory that links crime rates to neighborhood characteristics initiated by mapping delinquency across Chicago neighborhoods. It identified a robust statistical association between disorder and failure. As this theory was applied to the study of fear of crime, a link was found between incivilities and resident anxiety, especially for transition zones characterized by rapid population turnover, disadvantaged immigrant groups, residential instability, lack of cohesion, disorder, unemployment and few homeowners. In addition, physical signs are represented by deteriorated infrastructures, dilapidated buildings, vacant lots, homeless and unsupervised youth, and other incivilities (Kubrin & Weitzer 2003; Abdullah et al. 2014). This results in an inability of a neighborhood to informally control deviant behaviors and maintain order. For example, the theory suggests that youths from disadvantaged communities participate in a subculture that approves delinquency. These youths thus acquire criminality in this social and cultural setting (forged a delinquent tradition transmitted from older gangs to unsupervised youth). The disorder does not cause crime but instead indexes disorganization, which causes crime via weak informal control, the prevalence of unsupervised youth, and the creation and transmission of a delinquent tradition across age-graded youth groups (Markowitz et al. 2001; Kubrin & Weitzer 2003; Lanfear et al. 2020).

The overlap between theories (Broken Window and Social Disorganization) is evident, where both theories agree that chaotic neighborhoods have increased social problems. So, neighborhood disorganization creates an environment in which disorder is made. Then, residents observe signs of disorder and assess the danger, which negatively affects their assessment of the personal risk of victimization. Such perception is associated with fear of crime and potentially constrained social behavior (Lanfear et al. 2020). Based on that, it is necessary to understand the relationship between perceived safety and incivility signs in informal settlements. The importance of this is further amplified due to the continuous growth of their population, which is expected to increase to 2 billion by 2030. Most of these settlements are concentrated in developing countries and lack suitable infrastructure and public facilities (Al-Khasawneh 2017).

Informal settlements in Jordan

During the past decades, growing informal settlements have become one of the significant urban problems in Jordan (Al Daly 1999). This is related to several reasons: (a) the high cost of real estate due to the continuous growth of construction material; (b) increased population density because of regional political migrations (Palestine, Lebanon, Iraq, and Syria) and internal migrations from the countryside to major cities; and (c) tax enforcement of building regulations, which undoubtedly leads to disorder and chaos in the built environment (Al-Khasawneh 2017).

The research investigated Janna'ah neighbourhood, one of the oldest informal settlements in Al-Zarqa Governorate (25 km. northeast of Amman) in Jordan. It was selected because it represents the informal settlement environment and has high physical incivility signs such as abandoned buildings, poor lighting, litter, graffiti, vandalism, and abandoned cars. The neighbourhood is very crowded and has a high population density, as about 90,000 people live on a land area of 425061 m^2, most of which is owned by the government (Al-Tamimi 2018). The poor layout is related to the proximity of a Palestinian refugee camp, which haphazardly extended to the settlement borders without any planning. In the end, the neighborhoods in Janna'ah became similar to the camp layout in terms of crowdedness and layout.

Janna'ah neighborhood faces several challenges, as shown in Fig. 1; most notably, we see overcrowding, high population density, high unemployment rates, high student dropout rates, and a lack of essential services. Also, the neighborhood suffers from poor infrastructure, poor storm water management and an unsuitable drainage system (Ghuwairi 2011). This is associated with the declining quality of the built environment, the spread of abandoned buildings, and accumulation of litter, haphazard graffiti on walls, and abandoned wrecked cars. These signs threatened public security and residents' sense of safety (Al-Khudari 2019; Al-Tamimi 2017).

Research methodology

This research investigates the impact of physical incivility signs on residents' perceived safety in informal settlements. The used mixed-methods approach consisted of quantitative and qualitative investigations, as shown in Fig. 2:

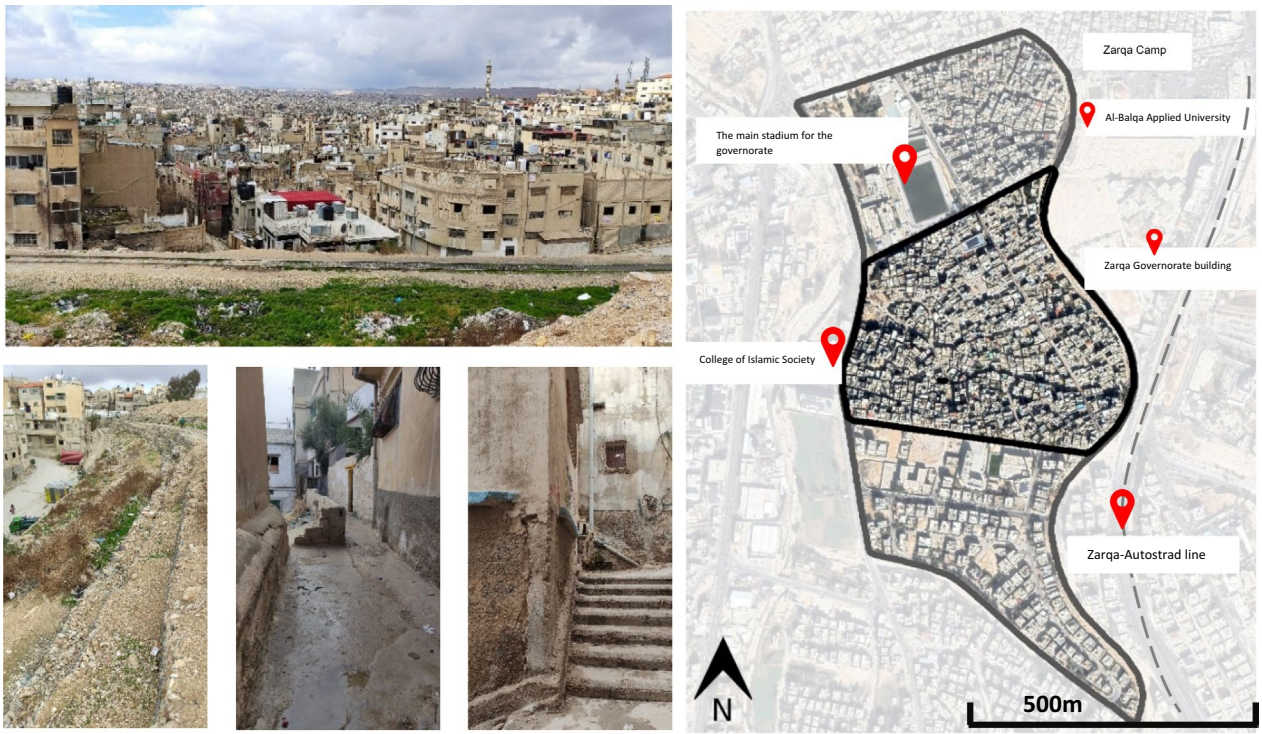

Fig. 1 Janna'ah neighbourhood: map and several views (Google Earth 2022)

a) Qualitative stage: Qualitative data provides a deep understanding of the research problem and can be used to interpret quantitative data. This stage aims to observe and identify the physical incivility signs in the settlement neighborhoods and explore the mechanisms residents use to improve their perceived safety.

This was achieved by:

(i) A content analysis was used to help understand Jannaah's neighborhood setting identify its physical incivility signs, and understand the relationship between these signs and perceived safety. This was also achieved by identifying the mechanisms to manage the problems associated with physical incivility signs in the neighborhood.
(ii) To comprehensively understand the selected research setting, several field observations of Jannah neighborhood were conducted at different times on different days. Using a set of criteria from previous studies, physical incivility signs were explored and documented through photos and maps. Observational data helped identify physical incivility signs in their natural setting to help understand how they relate to residents' perceived safety.

Physical incivility signs were observed according to the following criteria:

1. Abandoned building: referred to as an abandoned building with a low level of maintenance and management, poses a threat to the health and well-being of community members. It could be in danger of collapse and appears as a crime hotspot.

2. Abandoned car: refers to a vehicle parked on public streets or any public property for a long time with damage (missing or flat tires, missing doors or other significant parts, broken windshields or windows, garbage, and debris inside the car or around it).

3. Graffiti: refers to graffiti that deface the property, sidewalk, and walls representing a negative, disruptive, and in violation of community norms.

4. Signs of vandalism are signs of property damage or destruction, such as broken windows, apparent fire damage, or any damage or vandalism.

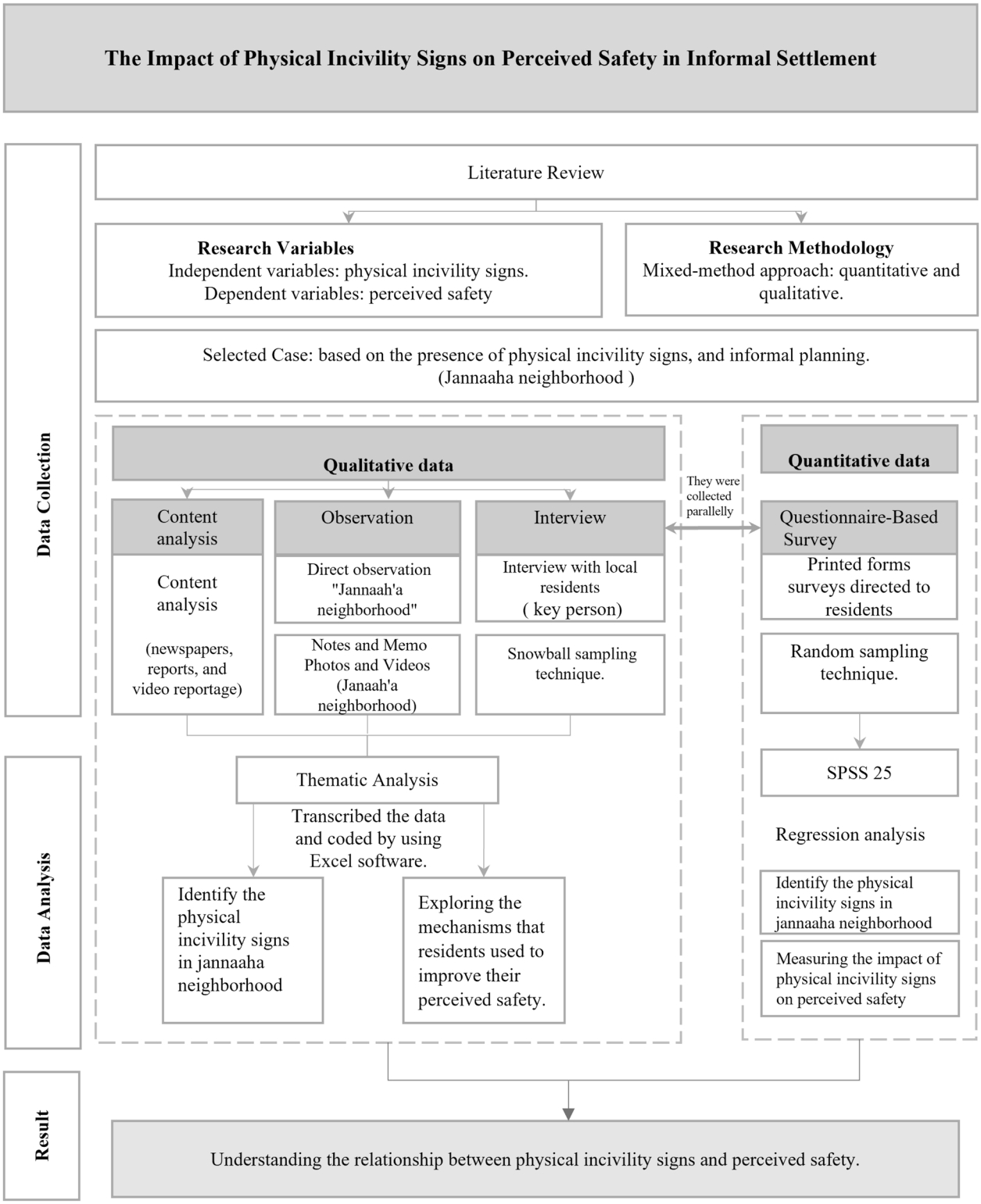

Fig. 2 Research framework

5. Trash: refers to noticeable trash accumulation (visible as waste piles).

6. Alleys: refers to alleys missing natural surveillance, lighting, cleanliness, effective pedestrian activity, connectivity, width and length of alleys, and presence of strangers.

7. Poor lighting refers to a low illumination level that negatively affects perceived safety.

(iii) (18) Semi-structured interviews were conducted in face-to-face discussions with residents (key persons) who live in Janna'ah neighborhood; they were recruited using a snowball sampling method and also participated in the survey. Data collection started with interviewing. The head of a neighbourhood committee and his assistants recruit other participants, including the school principal, active residents, municipal employees, and volunteers. The interviews aimed to understand how physical incivility signs affect the residents' perceived safety and to identify the mechanisms used to alleviate their negative impact. Three questions were used along with respondents' probing to explain and build on the responses.

The questions are:

How do you identify the following physical incivility signs (abandoned buildings, alleys, poor lighting, trash, signs of vandalism, graffiti, and abandoned cars)?

a) Do you believe that physical incivility signs such as (abandoned buildings, alleys, poor lighting, trash, signs of vandalism, graffiti, and abandoned cars) affect your sense of safety? What is the most significant sign? What is the source of threat?

What mechanisms can be used to improve your perceived safety?

b) Quantitative stage: Quantitative data provides a broad understanding of the research problem; it has been used to achieve the aims of this study by analyzing the relationship between dependent and independent variables. A structured questionnaire was used to identify physical incivility signs in the selected neighborhood and measure their impact on perceived safety. The questionnaire included 47 questions divided into five sections as shown in Table 1: (i) respondents' demographic profile; (ii) any previous victimization experiences of respond-

Table 1 Dependent and independent variables

Variable	Factor	Operational definition	No. of questions	Scale
Confounding variables	Demographic profile of respondents	Measured by respondents' demographics and socio-economic status	8	Nominal variables
	Previous victimization experience	Measured by personal victimization experiences	5	Nominal variables (yes/No questions)
Independent variables	Physical incivility signs	Measured by identifying the physical incivility signs in Janna'ah neighborhood, which can include [litter, graffiti, abandoned building, signs of vandalism, abandoned cars, lighting, alley]	7	Ordinal variables (5 Likert scales)
	Abandoned buildings	Measured by the impact of abandoned buildings on perceived safety	4	
	Poor lighting	Measured by the impact of poor lighting on perceived safety	3	
	Abandoned cars	Measured by the impact of abandoned cars on perceived safety	2	
	Alley	Measured by the impact of alleys on perceived safety	3	
	Sign of vandalism	Measured by the impact of signs of vandalism on perceived safety	2	
	Graffiti	Measured by the impact of graffiti on perceived safety	2	
	Litter	Measured by the impact of litter on perceived safety	2	
Dependent variables	Perceived safety	Measured by the amount of a person's sense of safety about himself or his properties, and an absence of concern about becoming a victim	9	Ordinal variables (5 Likert scales)

ents; (iii) evaluation of perceived safety in Jannaah; (iv) interpretation of physical incivility signs; and (v) respondents' feedback about the impact of physical incivility signs on residents' perceived safety.

Research sample

The research sample included 387 participants, 55.8% of whom were male. Most of the participants were aged between 35 and 54 years. Approximately 3.9% (n = 15) of the participants did not receive any formal education (illiterate), and 42.6% (n = 165) had received 12 years or less of schooling (primary or secondary). The remaining portion of the sample, 53.5% (n = 207), had a college degree. Most participants were married (65.1%) and owned their own houses (70.0%). This explained the relative stability of many residents, as more than a third of the population (40.8%) were unemployed, and 10.9% were retired. The last two elements may explain the frequent reporting of victimization experience by respondents a quarter of whom approximately were subjected to vandalism or theft (22.5% and 28.6% respectively); only 6.2% of them were victims of robbery or attempted robbery. In total, around one-third of the participants were exposed to 1–3 types of victimization, while only 5% were exposed to more than 3 types of victimization.

Measurement scale analysis

Three steps were taken to analyse scale analysis measures:

1) Reliability Analysis was done for the variables based on the reliability scale's four levels: excellent (0.90 and above), high (0.70–0.90), moderate (0.50–70), and low (0.50 and below) (Pallant 2020). Cronbach's alpha of 0.6 and higher is considered acceptable (Taber 2018). The results showed that all of the items had alpha values greater than 0.60, indicating that all alpha values were reliable.
2) Correlation Analysis was undertaken to determine the strength and direction of the linear relationship between continuous variables; the Spearman correlation coefficient was used in this study, where ($p < 0.001$) indicates a positive correlation and a significant relationship between the variables. The total correlation of all items was calculated, and the results exceeded 0.3. As a result, the reliabilities showed adequate convergence and good internal consistency.

3. Assessment of Regression Assumptions was examined before the analysis phase. These assumptions included:

a) Sample size: should be greater than 50 + 8 M (M = number of independent variables). Accordingly, the sample size of this study (n = 387) was greater than 98 (50 + 8*6).
b) Multi-collinearity: The tolerance value was greater than 0.10, and the VIF (Variance Inflation Factor) value was less than the cut-off value of 10. Therefore, no multi-collinearity is present in this study (Pallant 2020). Moreover, none of the independent variables has correlations greater than 0.7. The correlation among the independent variables was less than 0.655. Thus, all variables were maintained for regression analysis (Pallant 2020)
c) Outlier: There were no outliers in this study due to the following factors: (1) large sample size; (2) only two cases deviated from the standardized residual range (greater than ± 3); and (3) the maximum Cook's Distance value was less than one (0.271). As a result, all cases (n = 387) were included in the analysis.
d) Normality of data was presented in a normal distribution by the histogram, and the standard deviation was less than one (0.995). The scatterplot of the standardized residuals reveals a clear pattern in which the residuals were roughly distributed, with the highest scores concentrated around zero points.
e) Linearity: A linear relationship exists collectively between the dependent and independent variables by plotting a scatterplot of the standardized residuals against the (unstandardized) predicted values. The residuals create a horizontal band, so the relationship between dependent and independent variables is likely linear.
f) Homoscedasticity: Homoscedasticity was assessed by using a plot for visual inspection of standardized residuals versus unstandardized predicted values.

Results

The research results discussed according to the research approach as shown below:

1) Content analysis and direct observation: The results of content analysis and direct observation showed that the built environment in Janna'ah neighborhood is highly disordered, neglected, and overcrowded, as it suffers from a lack of essential services and poor infrastructure. Based on field observation, seven forms of physical incivility signs have been documented in Janna'ah neighborhood: abandoned buildings, narrow alleys, poor lighting, litter, signs of vandalism, graffiti, and abandoned cars. Spatial analysis later helped explore agglomeration patterns, as shown in (Fig. 3).

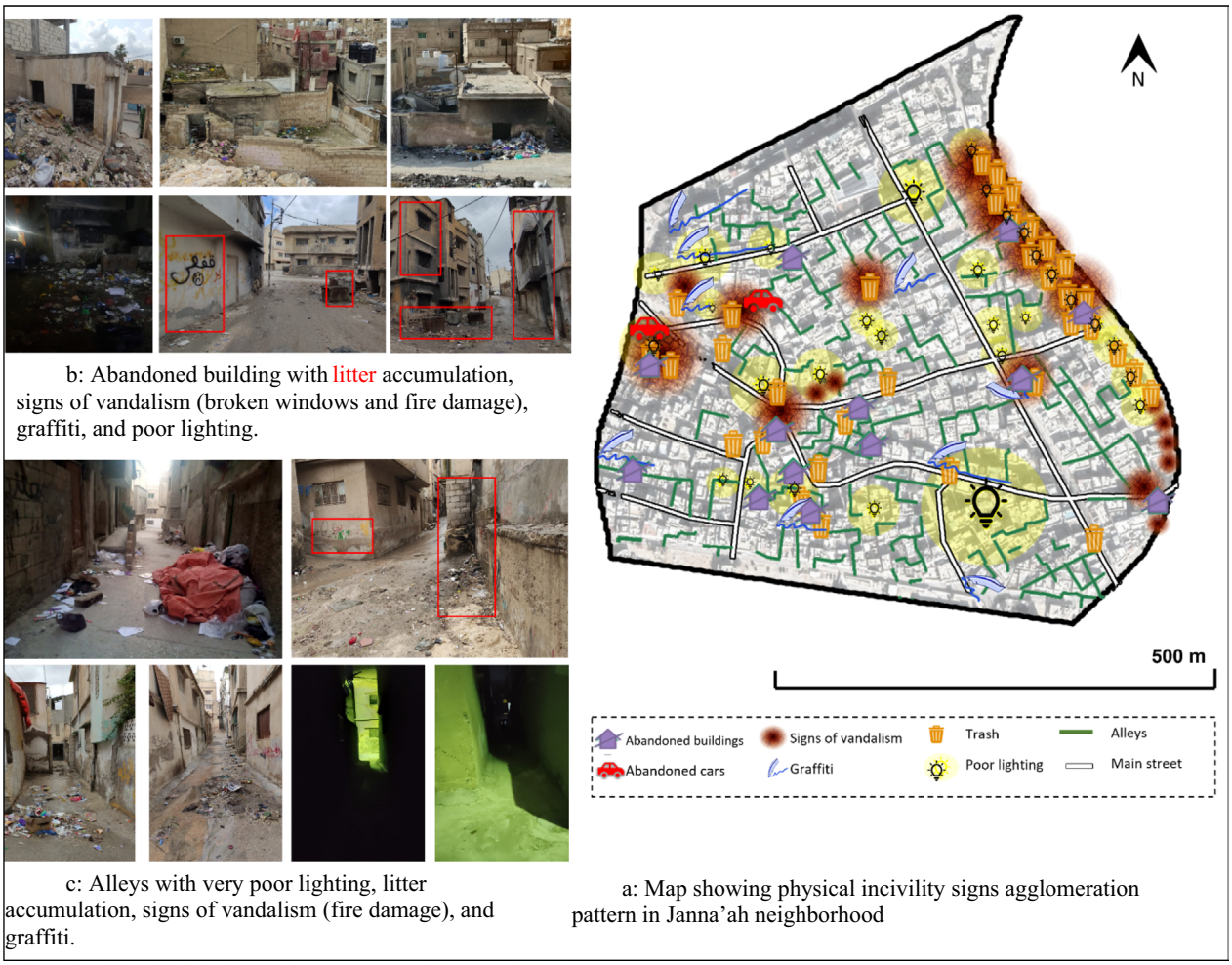

Fig. 3 Agglomeration pattern of physical incivility signs in janna'ah neighborhood

It can be noticed that more than one sign was agglomerated in the same place, which made these places known as hotspots regarding danger and attraction criminals' activities. The agglomerations patterns are visible in abandoned buildings and narrow alleys between buildings. Abandoned buildings are at a high level of physical incivility, with litter accumulation, signs of vandalism such as broken windows and fire damage, graffiti, and poor lighting. As for alleys, one could observe a low level of hygiene, signs of vandalism, graffiti, and poor lighting.

2) Quantitative results: Similarly, results of collected data indicated that physical incivility signs (independent variables) influenced perceived safety. Abandoned buildings have the highest mean score (4.40), followed by litter (4.32), lighting (4.17), alleys (4.04), (4.00) for both abandoned cars and signs of vandalism, while graffiti displayed the lowest mean (3.55). Concerning the dependent variables, the overall mean for perceived safety score was 2.89 out of 5, which indicated that participants had a medium level of perceived safety. Correlations between variables presented significant positive relationships between all variables ($p < 0.001$), as shown in Table 2.

Additionally, an independent samples t-test was run to determine if there were differences in perceived safety scores according to gender and homeownership. The mean score for perceived safety was statistically significantly higher in females ($M = 3.37$) than in males ($M = 2.51$), $t\ (385) = -\ 8.45$, $p < 0.0.001$. On the other hand, the mean score for perceived safety was statistically non-significant regarding homeownership (p-value > 0.05) as presented in Table 3.

One-way ANOVA test was performed to investigate differences in perceived safety according to participants' demographic profiles. Results showed

Table 2 Spearman correlation for constructs

	Abandoned buildings	Lighting	Abandoned cars	Signs of vandalism	Graffiti	Alleys	Litter
Abandoned buildings	1						
Lighting	0.494**	1					
Abandoned cars	0.525**	0.544**	1				
Signs of vandalism	0.968**	0.494**	0.525**	1			
Graffiti	0.463**	0.544**	0.418**	0.463**	1		
Allays	0.655**	0.585**	0.564**	0.655**	0.553**	1	
Litter	0.541**	0.547**	0.422**	0.541**	0.563**	0.492**	1
Perceived safety	0.313**	0.296**	0.196**	0.313**	0.265**	0.373**	0.172**

** Correlation is significant at the 0.01 level (2-tailed)

Table 3 Demographic profile of respondents and perceived safety

	Mean	SD	t/f value	P-value
Gender			− 8.45	0.000
Male	2.51	0.98		
Female	3.37	0.99		
Marital status			2.486	0.085
Single	3.03	1.15		
Married	2.81	1.02		
Other	3.29	1.23		
Age (years)			3.910	0.009
18–24	3.03	1.14		
25–34	3.08	1.10		
35–54	2.88	1.06		
55 ≤	2.53	0.88		
Education level			0.354	0.702
Illiterate	2.95	1.27		
≤ 12 years	2.94	1.14		
12 years <	2.85	1.00		
Occupation			12.88	0.000
Unemployed	3.19	1.04		
Employed	2.73	1.05		
Retired	2.44	0.98		
Residence period (years)			1.648	0.178
< 5	3.32	0.92		
5–10	2.92	1.01		
11–15	2.87	1.15		
15 <	2.84	1.08		
Home ownership			− 0.565	0.572
Owner	2.87	1.09		
Rented	2.94	1.04		

significant differences in perceived safety according to age (F (3383) = 3.910, p = 0.009) and occupation (F (2384) = 12.88, p < 0.0.001), but not regarding education level (F (2384) = 0.354, p = 0.702), social status (F (2384) = 2.486, p = 0.085), and residence period (F (3383) = 1.648, p = 0.178) as shown in Table 3.

The Bonferroni multiple comparison tests were performed to explore which groups significantly differed in perceived safety scores according to age. They showed that participants over 55 years had higher perceived safety than those over 55 years had more increased perceived safety than participants of other ages. Regarding occupation, the Bonferroni multiple comparison tests showed that participants who never worked (unemployed) had higher perceived safety than others.

Finally, multiple linear regression was run to predict the impact of incivility signs on perceived safety. The multiple regression model statistically significantly expected perceived safety, F (6380) = 12.75, p < 0.0001; R square was 0.168, indicating that the variables scored 16.8% of the variance in perceived safety. Three out of six variables added significantly to the prediction: p < 0.05. Thus, poor lighting, narrow alleys, and abandoned buildings had a significant impact on perceived safety. Regression coefficients and standard errors can be found in Table 4. The score of poor lighting leads to a 0.206 (95% CI 0.017–0.394) increase in perceived safety. Moreover, an extra score of alleys and abandoned buildings leads to a 0.327 (95% CI 0.148–0.507) and 0.181 (95% CI 0.020–0.341) increase in perceived safety score, respectively.

Interviews

The results of the interviews supported the quantitative results. Interviewees stated that there are seven common forms of physical incivility signs: abandoned buildings, narrow alleys, poor lighting, litter, signs of vandalism, graffiti, and abandoned cars. The interviews also revealed that abandoned buildings and narrow alleys were

Table 4 Multiple linear regression

	Unstandardized coefficients		Standardized coefficients	Sig	95.0% confidence interval for B	
	B	Std. error	Beta		Lower bound	Upper bound
(Constant)	0.452	0.393		0.250	− 0.319	1.224
Abandoned car	0.143	0.109	0.083	0.189	− 0.071	0.358
Poor lighting	0.206	0.096	0.141	0.033	0.017	0.394
Graffiti	− 0.085	0.061	− 0.086	0.162	− 0.204	0.034
Alley	0.327	0.091	0.256	0.000	0.148	0.507
Litter	− 0.184	0.096	− 0.121	0.057	− 0.374	0.005
Abandoned building	0.181	0.082	0.148	0.027	0.020	0.341

prominent factors that impacted perceived safety. This is because these places are often unsupervised and have low levels of surveillance and poor lighting, allowing them to become "hotspots" for criminal activities and drug traffic. Moreover, abandoned buildings, or even narrow alleys, being neglected and out-of-control places, allow strangers outside the neighborhood to come and practice negative behaviors and acts of vandalism. This increases the locals' fear of crime and reduces perceived safety. Responding to this situation, residents used several mechanisms to improve perceived safety that interviewees identified: (a) behavioral mechanisms represented by avoiding places with physical incivility signs; (b) physical mechanisms represented by several actions: (i) installing locks and lighting fixtures for external borders of housing properties; (ii) general cleaning to improve hygiene level through removing accumulated litter, graffiti, and fire damage; and (iii) demolition of abandoned buildings, especially those that constitute hot spots and are in danger of collapse, in cooperation with Zarqa Municipality.

Discussion

The main objective of this study was to assess the impact of physical incivility signs on perceived safety. The research results highlighted three elements that influenced perceived safety:

1) Demographic characteristics: Results from the quantitative analysis confirmed that age, gender, and occupation are the most significant demographic factors affecting perceived safety. Women were more expressive of their fear than men. This was supported by (Ladenburg et al. 2016), who assured that females commonly have higher rates of fear of crime compared to men. As for age, participants over 55 had a significantly higher perceived safety than those of other ages. This contradicted findings in the literature which stated that the relationship between age and perceived safety is less clear than for other human variables, according to Chadee and Ditton (2003). In different research results, Rountree and Land (1996) found that older people were less likely to express fear and insecurity. Moreover, LaGrange and Ferraro (1989) proved that the fear of crime among the elderly was not significantly higher than in other age groups.

Socioeconomic status (income, education, and occupation) was revealed to impact perceived safety, where individuals who did not work had higher perceived safety than others. This may -contradict previous literature that confirmed a positive relationship between (education and occupation) and high levels of perceived safety (Baba et al. 1989; Skogan & Maxfield 1981; Toseland 1982). This was explained by interviewees who referred to unemployment as encouraging young people to engage in negative behaviors; hence, they may be the problem's creators. This is supported by social disorganization theory, where unsupervised youths from deprived neighborhoods may participate in groups that approve delinquency. Primarily such negative behavior will be supported by deteriorated infrastructures infrastructure of the neighborhood (Kubrin & Weitzer 2003; Lanfear et al. 2020). Accordingly, there is a need to initiate training and programs to generate job opportunities and improve safety.

2) Previous victimization experiences: The results revealed that 58% of residents weren't exposed to any victimization experience, and only 5% were exposed to more than three types of victimization. The interviews explained this as the result of strong social ties and networks between residents that make them act collectively against any threat. Social relations are a security mechanism that pro-

tects them from various types of victimization and crime. This was supported by the literature, which reported that people might continue walking alone in their area and feel safe despite the high crime rates there (Taylor 1996). Indeed, the role of victimization experiences in explaining individuals' attitudes toward perceived safety is part of a network in their environment and neighborhood interaction patterns (Myers & Chung 1998).

3) Physical incivility signs: Results revealed significant correlations between physical incivility signs and perceived safety. This was confirmed by previous research that demonstrated a negative influence of physical incivility signs since they motivate people to make assumptions about the area regarding control and order, which negatively impacts the sense of safety (Skogan & Maxfield 1981). Quantitative analysis showed that the most important physical incivility signs affecting perceived safety are abandoned buildings, alleys, and poor lighting. This was confirmed and explained through qualitative analysis results, which also revealed that abandoned buildings and narrow alleys have the most impact on individuals' perceived safety.

a) Abandoned buildings: The results showed a strong relationship between this sign and perceived safety since they are considered "hotspots" that attract strangers, criminals, and drug addicts. They act as havens for bad people to commit crimes without surveillance. This was supported by previous literature, which confirmed that criminals are attracted to abandoned buildings because they meet their needs, and there are no controls on that (Botts 2010; Fletcher 2021; Kondo et al. 2015).

   Janna'ah neighborhood is one of the most prominent neighborhoods with many abandoned houses, which constitute health and environmental hazards and may be a hub for illegal practices. These prompted residents to demand radical solutions such as demolishing all abandoned buildings that are considered sources of threat and cleaning up the accumulated litter. Simultaneously with these houses' destruction, all abandoned, wrecked cars in the neighborhood were removed. Such actions helped improve the physical environment and positively impacted perceived safety, as shown in Fig. 4.

b) Alleys: The results showed a strong relationship between this sign and perceived safety. Such alleys are usually associated with low hygiene (litter, fire damage, and graffiti) and poor lighting, making them a hotspot for potential criminals. Generally, activities inside alleys are not visible from the street; therefore, the possibility of criminal activities is high. Moreover, alleys lack surveillance by locals. This is in line with what was mentioned in previous literature, that the alley's physical incivility negatively influences individuals' perceived safety (Aleman 2020; Jiang et al. 2018). Alleys are considered an integral part of the formation of informal settlements, and this is related to the absence of regulations enforcement. Alleys in Janna'ah neighborhood are neglected and lack the minimum level of services such as hygiene, lighting, and accessibility. It is worth noting that the high proportion of alleyways, compared to wider streets, creates a tunnel feeling for locals navigating through Janna'ah neighborhood. The width is minimal compared to the height of the surrounding buildings, as shown in Fig. 3c. So, alleys there lack natural surveillance and natural lighting.

   The spatial configuration of alleys in informal settlements is not safe. Thus, they provide opportunities to practice inappropriate behaviors and drug abuse. To counter such practices, Janna'ah's residents endeavor to use physical mechanisms to improve their sense of safety, such as installing locks on windows, cleaning accumulated litter, launching initiatives to remove graffiti and signs of vandalism, and installing external lighting fixtures, as shown in Fig. 4. It must be noted that these mechanisms are individual efforts limited to cleaning, painting, and beautification and do not achieve grassroots change or development; neither do they curb physical incivility signs and the associated problems.

c) Poor lighting: The results showed a strong relationship between this sign and perceived safety. They also demonstrated that poor lighting increases the negative impact of both abandoned buildings and alleys on perceptions of safety. It was shown that poor lighting negatively impacted natural surveillance and, thus, safety. Such a situation in Janna'ah neighborhood makes residents continuously try to improve lighting quality by using external lamps, which may promote surveillance and reduce criminals' chances to commit crimes, thus improving the sense of safety, as shown in Fig. 4.

In general, it can be said that residents grew accustomed to infrastructure deficiency and the presence of

Closing alley with a wall Improve the external lighting

Added protection fences Improving the level of hygiene by removing graffiti.

Demolition of abandoned buildings

Improving level of hygiene by cleaning public spaces of neighborhood

Fig. 4 Sample of mechanisms that used to improve the level of safety

physical incivility signs. Therefore, these signs, taken separately, may not affect their sense of safety. However, the combination of many signs acts as "hotspots". For example, poor lighting alone may not mean much if it is not placed in a context that affects perceived safety such as in alleys or abandoned buildings. Another example is dispersed litter in different parts of the neighborhood; as a single sign, it may not affect individuals' perceived safety. Conversely, people may interpret piles of litter in abandoned buildings or alleys as signs of lack of surveillance, as hiding places for potential attackers, and as indicators of criminal activity.

Finally, more incivility signs in one place will make it a "hot spot" for criminal activities and increase fear of crime.

It is worth indicating finally that the length of residency is strongly associated with individuals' perceived safety (Swatt et al. 2013). Long-term residents in the neighborhood grow better social relations and networks, which influence place attachment and stability and, in turn, improve their sense of safety. This study's quantitative results revealed that a length of residency of more than 15 years characterized (by 64.1%) of the participants. So, residents' stability explained the strength of social bonds between them. It also helped to initiate volunteering actions through the community's commitment to promote the built environment and remove incivility signs, with activities such as cleaning, painting, and other beautification works mentioned by residents.

Conclusion

Safety is affected by the characteristics of residents and those of the neighborhood; such interaction is noticed in informal settlements. Regarding demographic characteristics, women were more expressive of their feelings than men. At the same time, participants over the age of 55 had a significantly higher perceived safety compared to participants of other age groups. Moreover, individuals who did not work (were unemployed) had more perceived safety than others. Concerning neighborhood characteristics, the deteriorated built environment, represented by physical incivility signs such as abandoned buildings, narrow alleys, poor lighting, litter, signs of vandalism, graffiti, and abandoned cars, contributes significantly to a feeling of unsafety. These signs act as hot spots, especially if two or more work together to produce a sense of unsafety. This research showed that the most significant physical signs affecting perceived safety are abandoned buildings, alleys, and poor lighting. They also revealed that abandoned buildings and alleys are often unsupervised and have low levels of surveillance and poor lighting, which could provide an opportunity to attract strangers from outside the neighborhood, criminals, and drug addicts to practice negative behaviors and criminal activity there. Generally, although residents adapted themselves to the deteriorating conditions of the neighborhood and poor infrastructure, they were able to realize the impact of the hotspots on their sense of safety and facilitate the implementation of several mechanisms to improve their sense of safety, whether behavioral or physical.

In general, assessing the neighborhood's physical characteristics essential neighborhoods physical characteristics is essential to understanding operations in the neighborhood, carrying out the necessary intervention, and executing potential changes. This will be helpful to direct the efforts of official institutions and initiatives to achieve justice, which can be facilitated through the following practices: (a) developing programs and supporting local initiatives to help neighborhoods reduce the future spread of physical incivility signs, and then improve individuals' perceptions of safety; (b) urging residents to participate in community preservation to fight the fear of crime. Accordingly, future intervention plans should focus on community engagement to decrease neighborhood physical incivility. It is assumed that this will have the greatest potential to enhance territoriality and produce mutual trust among individuals; and (c) reconsider urban regulations and policies that deal with the management of abandoned buildings, lost spaces, and alleys to stimulate pedestrian activity, especially at night, and thus improve natural surveillance.

This study is considered a starting point in this field that needs to be expanded to include more informal settlements, deprived neighborhoods, refugee camps, and other similar environments. At another level, this study emphasized only the impacts of physical incivility signs on perceived safety. Therefore, it will be necessary to highlight other factors, such as social signs, in the hope that this will enhance validity and reliability, which then makes a better chance for generalization.

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