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Abstract: In the face of demographic change, increasing mobility, institutional transformations, and escalating interstate tensions and conflicts, local communities are exposed to new forms of risk and uncertainty. In this context, perceived safety becomes an important indicator of local resilience. The article aims to identify the dimensions of perceived safety and examine their links to individual characteristics (social capital, local rootedness, civic agency) and the contextual social potential of residents in rural municipalities located in suburban areas. The study is based on a representative survey of adult residents ($N = 607$), conducted in 2024 in six rural municipalities in the Łódź Metropolitan Area. Factor analysis was used to construct a three-component perceived safety index (social, housing, spatial). Subsequently, two-level Generalised Linear Mixed Models and ordinary least squares regression models were estimated. The analysis shows that the perceived safety is moderate. It is strengthened by trust in municipal authorities, pro-newcomer attitudes, place attachment, readiness for co-decision making, and trust in close ties. Age and trust in entrepreneurs are negatively associated with perceived safety. The inter-municipal variance proves statistically nonsignificant, indicating that individual-level social factors are more important than contextual (municipal) factors for local resilience.

Keywords: rural resilience, perceived safety, social potential, suburban rural municipalities, social capital, factor analysis, Poland

Streszczenie: Poczucie lokalnego bezpieczeństwa a potencjał społeczny mieszkańców wsi. Wyniki badań z Polski. W obliczu przemian demograficznych, rosnącej mobilności, przekształceń instytucjonalnych oraz narastających napięć i konfliktów międzypaństwowych społeczności lokalne są narażone na nowe formy ryzyka i niepewności. W tym kontekście poczucie bezpieczeństwa staje się ważnym wskaźnikiem odporności lokalnej. Celem artykułu jest identyfikacja wymiarów poczucia bezpieczeństwa oraz zbadanie ich związków z indywidualnymi cechami (kapitał społeczny, zakorzenienie lokalne, sprawczość obywatelska) oraz kontekstowym potencjałem gmin wiejskich położonych na obszarach podmiejskich. Badanie opiera się na reprezentatywnym sondażu dorosłych mieszkańców ($N = 607$), przeprowadzonym w 2024 roku w sześciu gminach wiejskich wchodzących w skład Łódzkiego Obszaru Metropolitalnego. Zastosowano analizę czynnikową do konstrukcji trójskładowego wskaźnika poczucia bezpieczeństwa (społecznego, mieszkaniowego, przestrzennego). Oszacowano dwupoziomowe uogólnione modele liniowe z efektami mieszanymi oraz modele regresji liniowej metodą najmniejszych kwadratów. Wyniki wskazują, że poczucie bezpieczeństwa jest na umiarkowanym poziomie. Wzmacniają je: zaufanie do władz gminy, przychylność wobec osób napływowych, przywiązanie do miejsca zamieszkania, gotowość do współdecydowania oraz zaufanie w relacjach z bliskimi. Osoby starsze i o większym zaufaniu wobec przedsiębiorców cechują się niższym poczuciem bezpieczeństwa. Zróżnicowanie międzygminne okazuje się statystycznie nieistotne. Zatem dla odporności lokalnej większe znaczenie mają indywidualne czynniki społeczne niż kontekstowe (gminne).

Słowa kluczowe: resyliencja, odporność obszarów wiejskich, poczucie bezpieczeństwa, potencjał społeczny, podmiejskie gminy wiejskie w Polsce, kapitał społeczny, analiza czynnikowa

Highlights

- A three-dimensional (social, spatial, and housing) index of local safety explained 66% of the variance
- The safety assessment of rural residents was moderately high

- Positive predictors of safety: trust in authority, attachment to place, co-decision, and pro-newcomer attitudes
 - Higher age and greater trust in entrepreneurs are associated with a lower sense of safety
 - Individual attitudes outweighed the local context in perceived safety; the variance at the municipal level is not significant
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1. Introduction

The global economic crisis of the first decade of the twentieth century led to a sharp rise in unemployment and a weakening of local housing markets in rural areas (Scott 2013, p. 597). In the following years, successive migration crises triggered a large influx of refugees, placing additional pressure on public services and intensifying cultural tensions (Prusaczyk 2023). Today, rural areas face increasing demographic challenges (ageing and depopulation) and ecological challenges (droughts, floods, and heatwaves). These developments pose serious risks to the health and safety of rural populations. In this context, resilience has gained prominence in rural studies. Scholars emphasize that resilience is grounded in the mobilisation of endogenous resources (Shucksmith, 2009; Bosworth and Atterton, 2012). A sense of safety, an essential component of resilience, plays a vital role in mitigating the effects of successive crises and accelerating the recovery process (Wiig and Fahlbruch 2019). Rural resilience is commonly defined as the ability of communities to cope with and adapt to changing external conditions and various threats (Nguyen and Akerkar 2020). The concept is situated at the intersection of ecological, economic, and cultural functions, and emerges through interactions among these systems (Błąd 2022).

This paper approaches the notion of **safety** from a **social and subjective perspective**. Sociological frameworks understand security as encompassing both the relationship between the individual and the broader social system, as well as direct interpersonal interactions that shape the subjective experience of threat or its absence (Marody et al. 2019). Within the context of the risk society, subjective security reflects not only the quality of individual–institution relations but also the overall condition of the community (Jarmoszko 2016). In rural municipalities, where neighbourly bonds and a sense of local identity are particularly strong, social safety is closely intertwined with local potential. This includes both inherent (endogenous) resources and the capacity to mobilise them, particularly through relational capital (Rosner 2002; Bański 2008).

The objective of this article is twofold. First, to identify the dimensions and levels of subjective sense of safety among residents of suburban rural municipalities. Second, to examine the relationship between this phenomenon and elements of both individual and contextual social potential.

Empirical research focuses on six suburban rural municipalities located within the metropolitan area of the Łódź Voivodeship (Central Poland). These units operate within a complex and dynamic organisational environment, for example, demographic and urbanisation processes, along with the growing importance of non-agricultural functions (Jezierska-Thöle 2018, p. 56). The positioning of this study within the context of Polish suburban municipalities provides a valuable reference point for comparative analyses in other European countries. The Polish case warrants particular attention due to the country's experience with dynamic suburbanisation processes within the OECD area, which have generated new social tensions (OECD 2022, p. 12). Suburban rural municipalities where wealthy urban residents relocate to the countryside while maintaining strong ties to the city are increasingly subject to various forms of social and political discord (Szymańska 2013).

Despite extensive research on health safety (Abraham and Ceccato 2022) and social capital (Putnam 2000; Bourdieu 1986), comprehensive analyses examining the interrelations between these concepts in rural contexts remain limited. Existing scholarship has focused predominantly on urban settings, where issues such as crime, migration, and social inequality have shaped the dominant research agenda (Abraham and Ceccato, 2022).

Nevertheless, rural areas (characterised by distinctive social structures, specific types of risk, and strong community ties) require a dedicated analytical framework (Bański 2008). Research on rural security has

focused predominantly on tangible dimensions, such as infrastructure and crime rates. However, a notable lack of comprehensive analyses remains in exploring how social capital, local bonds, and trust influence the subjective sense of safety. Additionally, interdisciplinary approaches that integrate sociology, psychology, and social geography are largely lacking. This gap limits our ability to fully grasp the complex interplay between social potential and perceived safety. However, understanding this relationship is crucial to inform public policies that aim to improve the resilience of rural areas to social and environmental challenges (Aldrich 2012; Flora and Flora 2007). There is a pressing need for in-depth empirical studies that investigate how social capital and its components, along with demographic, social, and economic factors, shape the sense of safety of rural residents. Such research must take into account the cultural and environmental specificities that define rural areas.

2. Theoretical Background

2.1 Safety

Security research is generally approached from two complementary vantage points: the objective, based on police statistics and crime geography, and the subjective, which focuses on residents' perceptions of threat. From a sociological perspective, security is defined as an objectively determined state of safety, inherently linked to a subjective, emotional, and psychological perception of space as secure. This broader understanding of security encompasses the individual's sense of safety within their daily environment. From a comprehensive perspective, social security refers to the stability and continuity of social life. It enables society to engage constructively with its core components: individuals, social structures, institutions, and organisations. It involves ensuring the conditions necessary for the effective and meaningful functioning, as well as the survival and development of the community.

In contrast, the sense of safety is rooted in the individual's embeddedness within the social system. It enables the predictability of social behaviour and the perception of the world as meaningful and comprehensible (Giddens 1991). However, every social order inevitably produces new risks, to which individuals respond by developing new strategies of action (Beck 2002). In the context of rural areas, this dimension has significance due to the distinct social, spatial, and cultural characteristics. Stronger social bonds, familiarity with neighbours, higher levels of trust, lower crime rates, and lower population density typically characterise rural areas. This results in fewer interactions, but also in less anonymity. The sense of safety in rural areas constitutes a key component of the overall quality of life of residents. Sociological and geographical literature emphasises its multidimensional nature. It encompasses not only protection from crime but also social stability, access to services, neighbourly relations, and trust in the local environment and institutions (Ceccato 2015; Forrest and Kearns 2001).

Three distinct forms of perceived safety can be identified: general, spatial, and social. First, it refers to the subjective assessment of residents of the degree to which they feel protected from physical, social, economic, and environmental threats in their place of residence (Ceccato 2015). The second involves evaluating the physical environment, including spatial layout, lighting, visibility, and the presence of familiar individuals (Ceccato 2015; Forrest and Kearns 2001). The last is understood as the perceived availability of support and assistance in times of crisis, such as loss of employment, illness, or old age (Bauman, 2001).

2.2 Social and non-social determinants of the sense of safety

The social potential is defined as the capacity of local populations to mobilise their resources. This concept mainly comprises factors such as social capital, civic participation, local rootedness, and socio-demographic characteristics. The emergence of development potential depends on specific institutional, cultural, and spatial contexts. Its effectiveness is shaped by the quality of relationships among actors, the availability of resources, and the capacity for adaptation and innovation (Bourdieu 1986; Putnam 2000; Shucksmith 2009).

Social capital, understood as networks of relationships, norms of reciprocity, and trust (Putnam 1995; Coleman 1988; Bourdieu 1986), has been shown to enhance the subjective sense of safety by facilitating rapid responses and recovery in times of crisis (Dynes 2006). In rural settings, where social bonds are typically stronger, a form of “social transparency” tends to operate. Informal support and traditional mechanisms of social control are often more effective in mitigating risks in such environments. At the same time, high levels of social capital can foster exclusion and distrust toward outsiders, thereby constraining adaptability and openness to change (Bański 2019; Putnam 2000). Social networks in rural areas, which encompass neighbouring, family and other informal ties, contribute significantly to the sense of safety. They strengthen trust, willingness to assist, and informal mechanisms of social control (Forrest and Kearns 2001). In contexts where access to formal institutions is limited, these networks play a compensatory role. They facilitate the flow of information, mobilise local resources, and integrate communities in times of crisis (Milbourne 2012). The stronger and more trust-based networks, the higher the level of perceived safety, both at the individual and collective level (Green and Haines 2016). Reciprocity standards, as a key component of social capital, reinforce social bonds, trust, and cooperation, particularly in rural municipalities with strong neighbourly relationships. They enable informal resource exchange and mutual support, which contribute to local cohesion and social resilience (Putnam, 2000; Aldrich and Meyer, 2015). In the European context, such norms have been observed to be more pronounced in municipalities with shared identity and stable social structures. However, their persistence depends on factors such as migration, demographic shifts, and development policies (Bock 2016). Reciprocity, whether direct or reputation-based, often serves as a substitute for formal institutional support in peripheral settings.

Interpersonal and institutional trust, as core components of social capital, foster cooperation, reciprocity, and solidarity, thereby strengthening the sense of safety (Putnam 2000). Confidence in neighbours encourages grassroots initiatives. The positive perception of public authorities and law enforcement increases the willingness of residents to engage in public services and report potential threats. Communities characterised by strong mutual reliance tend to feel safer, even in the face of objective risks (Ross, Mirowsky, and Pribesh, 2001). In contrast, a lack of confidence in others undermines the ability to respond effectively to crises such as pandemics or natural disasters (Skidmore and Toya 2002). Frequent face-to-face interactions and familiarity within the local community further reinforce shared responsibility, which in turn contributes to higher levels of subjective and objective safety.

Participation in rural affairs plays a vital role in maintaining social cohesion, building social capital, and strengthening the resilience of local municipalities (Putnam 2000; MacKinnon and Derickson 2013). This involvement takes various forms. The literature commonly distinguishes three main types: social, political, and public participation. The first refers to voluntary actions taken for the benefit of the community, such as involvement in local organisations, neighbourly assistance, or participation in informal groups. In rural contexts, these activities foster relationships based on trust and reciprocity (Putnam 2000). The second encompasses involvement in political life, including voting, taking part in public consultations, or joining political parties. In rural areas, this often takes the form of participation in local governance structures or engagement in social protest movements (Kováč and Kučerová 2006). The third involves civic activity oriented toward the common good, such as initiatives related to local services, education, or environmental protection. This type of engagement combines elements of both social and political participation, but often occurs outside formal institutional frameworks (Sørensen and Torfing 2005).

The rural context simultaneously facilitates and constrains civic involvement. On the one hand, strong neighbourly ties, prevailing norms of reciprocity, and traditions of collective action promote participation and enhance the sense of safety (Flora and Flora 2007; Skerratt 2013). On the other hand, rural municipalities can face barriers such as civic apathy driven by institutional distrust, limited access to information, marginalisation of certain groups (such as youth or newcomers), and the dominance of informal networks based on local favouritism or affiliation with “insiders” (Woods 2010).

The sense of safety is also shaped by socio-economic and demographic factors. Women report feelings of fear more frequently, while men, although exposed to real risks, are less likely to acknowledge them (Bogacka 2017). Older people, particularly those living alone, are more likely to experience insecurity,

whereas younger residents tend to focus on the availability of services (Phillipson 2007). The presence of multigenerational households and extensive support networks is associated with higher levels of perceived safety.

Higher levels of education are associated with greater awareness of risk, civic engagement, and a stronger sense of control (Bogacka 2017). Material well-being improves access to services, better housing conditions, and private forms of protection (Shucksmith 2009). Demographic changes, particularly the accelerated ageing of rural populations, exacerbate the problem of social isolation in municipalities with limited transport infrastructure and scarce public services (Champion and Brown 2012). However, strong intergenerational and neighbourly ties can help to mitigate these effects (Glasgow and Brown 2012).

As a result, the sense of safety depends on a complex interplay of factors age, family structure, educational attainment, material conditions, and the quality of social networks. Collectively, these factors shape the capacity of municipalities to cope with everyday pressures and extraordinary challenges (Milbourne 2012).

Attitudes toward outsiders represent an important component of rural social potential. Dense, neighbourly, and family-based ties often encourage social closure, which has historically contributed to community cohesion but also fostered distrust of newcomers (Halfacree 2006; Shucksmith 2018). A growing number of incoming residents (urban migrants or war refugees) may undermine the subjective sense of safety by disrupting cultural continuity and placing pressure on public services (Castles, de Haas and Miller 2014).

Research suggests that as the proportion of new settlers increases, long-term residents tend to express heightened concerns over the loss of local identity, even when economic benefits are acknowledged (Stockdale 2006; Woods 2010). Rural residents generally report a greater social distance from *newcomers* compared to urban populations (Palermo et al., 2022). However, when local institutions actively promote dialogue and integration, newcomers can contribute valuable knowledge, foster cooperation networks, and stimulate entrepreneurship. These contributions help to strengthen both resilience and the collective sense of safety

The length of residence and active participation in community life contribute to the development of local trust and a sense of rootedness, both of which reinforce the subjective sense of safety (Glasgow and Brown 2012). Individuals with strong connections to the local community are more likely to report higher levels of trust in neighbours, which reduces fear of the unknown and enhances their perceived control over the surrounding environment. Strong local identity functions as a psychological "anchor of safety," particularly during times of economic or migratory crisis. Residents who feel a strong attachment to their municipality are more likely to engage in mutual support, thereby strengthening local resilience and reducing feelings of isolation (Delanty, Wodak and Jones 2008). **Social integration and regular interpersonal interactions increase the predictability of daily life, fostering a sense of belonging**, that helps mitigate subjective perceptions of threat (Putnam 2000; Forrest and Kearns 2001).

3. Data and Methods

Based on the stated purpose of this article, three specific research questions were formulated:

1. What dimensions constitute the subjective sense of safety, and what is their average level within the studied population?
2. What is the level of key variables related to social potential?
3. Which components of social potential (individual or contextual) are more strongly associated with the sense of safety?

The answers to these research questions are based on data collected within the project "Local Housing Policy in Rural Municipalities within the Metropolitan Area of the Łódź City", supported by the Faculty of Economics and Sociology under the #Eksocgrant programme (2023 edition). The survey was conducted in the first half of 2024 in six rural municipalities: Andrespol, Zgierz, Nowosolna, Ksawerów,

Pabianice, and Brójce (see Table 1). These municipalities are located near Łódź, Poland’s third-largest city. The area combines traditional agricultural landscapes with rapidly developing suburban zones shaped by the proximity of the city centre. This setting provides a diverse social and economic context for examining local resilience and subjective sense of safety. The study area falls within what Bański (2008) describes as a zone of progression, characterised by intensive socio-spatial transformations driven by suburbanisation processes.

Tab 1. General characteristics of municipalities. Source: Miklaszewska et al., 2024

Index / Municipality	Andrespol	Brójce	Nowosolna	Ksawerów	Pabianice	Zgierz
Area (km ²)	25.7	69	54	13.6	87.7	199
Population in 2020	14 391	7 103	5 439	7 649	8 311	15 828
Net migration (‰)	12.6	13.7	18	2.9	25.6	14.2
Agricultural land (%)	35.7	86.3	63.9	71.3	73.5	59.5
Built-up areas (%)	35.7	6.9	11.6	28.1	7.2	8.9

3.1 Sampling and variables

We employed a stratified random sampling design with proportional allocation to ensure that each municipality was represented according to its population size. A total of 607 adult residents (18 and older) participated in the study (see Table 2). Data were collected through structured face-to-face interviews using a standardised questionnaire administered by trained interviewers between January and June 2024.

Tab 2. Background characteristics of the respondents (N = 607). Source: authors’ own elaboration

Characteristics		Respondents [%]	Characteristics		Respondents [%]
Gender	Women	52.7	Age	18 – 34	21.8
	Men	47.3		35 – 54	40.3
Education	Primary	9.4		55 and more	38.1
	Vocational	19.8	Length of residence	≤ 10	23.4
	Secondary	43.2		11–20	17.5
	Higher	27.7		21–30	18.0
Average monthly income for the entire household (in PLN)	Up to 4000	21.5		31–40	11.5
	4001–8000	30.8		41+	29.7
	Over 8000	47.8			
Local family roots	Family members	65.0	Objective rooting	Native-born	40.0
	Nobody	35.0		Non-native born	60.0

The subjective sense of safety (the dependent variable) was derived via factor analysis using the principal components method with Varimax rotation. From the initial pool of items capturing this perception, those that best represented the structure of shared variance were retained. The criteria for factor retention included eigenvalues greater than 1 and factor loadings of 0.40 or higher. This procedure yielded nine items that loaded onto three distinct factors, which together explained 66% of the total variance after rotation. All selected items were sufficiently inter-correlated to justify joint analysis. A composite local index was then constructed as the sum of the three subcomponents, following standardisation of the scores (z-scores). The scale’s reliability was acceptable for sociological research (Cronbach’s $\alpha = 0.711$; see Hair et al., 2014). Higher values of the index indicate a stronger outcome on this construct.

Two categories of explanatory variables (predictors) were operationalised, corresponding to the two levels of the data structure: individual and contextual. At the individual level (Level 1), the explanatory variables included those identified in the literature as core components of individual social potential. These variables encompassed social capital (reflected in social networks and interpersonal trust), local

rootedness and attachment to the municipality, sense of personal agency and willingness to cooperate, as well as social, public, and political engagement. Attitudes toward outsiders were also assessed, along with selected socio-economic characteristics such as gender, age, income, and the presence of home surveillance systems. The selection of these indicators was based on their theoretical relevance to the concept of perceived safety, as well as their availability within the survey instrument. The contextual predictor was defined as the respondent's membership in a specific municipality (Level 2). This refers not only to the place of residence, but also to the characteristics of the local environment, including prevailing social norms, institutional quality, traditions of cooperation, social infrastructure and local government policy. These elements together form an opportunity structure that either facilitates or constrains the development of individual resources and action strategies. Although the specific attributes of these local conditions were not directly measured, the use of clustering effects enables the identification of their cumulative contextual impact (Raudenbush 2002).

To identify the significant predictors and assess the impact of municipal context on the explained variance, two modelling strategies were employed:

1. A two-level Generalised Linear Mixed Model (GLMM) with a random intercept, where individual respondents constituted level 1 and the six municipalities constituted level 2.
2. A conventional Ordinary Least Squares (OLS) regression, applied for comparative purposes without accounting for clustering.

Both models were estimated using the same set of fifteen predictors. The differences between them concern only the presentation of results: in the OLS model, we report all variables, whereas in the GLMM we present only statistically significant predictors (in line with standard reporting practices for mixed-effects models and using Satterthwaite's approximation for the degrees of freedom). This does not imply any variable selection at the specification stage; both models rely on an identical set of input indicators.

Multicollinearity diagnostics ($VIF = 1.02\text{--}2.55$) did not reveal problematic dependencies among the predictors, which confirms the stability of the estimates in both models. Given the cross-sectional nature of the data, the models are correlational, allowing for the identification of co-occurring associations but not permitting causal inference.

The rationale for parallel modelling of both individual and contextual levels is well supported in the literature on multilevel analysis (Hox et al., 2017). The relative contribution of each level was assessed by comparing marginal R^2 (fixed effects only) with conditional R^2 (fixed effects plus random intercept), and by examining the relationship between standardised beta coefficients and the estimated between-municipality variance. The results of the GLMM are presented first, following the hierarchical structure of the data. These findings are then followed by the outcomes of a simplified OLS model, which demonstrate the convergence of results and reinforce the robustness of the overall analysis. Multicollinearity diagnostics indicated no problematic associations among the predictors (Variance Inflation Factor ranging from 1.02 to 2.55)².

4. Results

4.1 Sense of safety

Based on the structure of factor loadings for nine variables reflecting various aspects of local safety, three internally consistent components were identified (see Table 3). The first captures the respondent's overall subjective sense of social comfort in their local environment. It includes the perception of the municipality as calm and safe, evaluations of neighbourly relations, and satisfaction with security in public spaces. The second factor relates to the spatial dimension and includes reverse variables that measure awareness of local problems, such as the expansion of construction into areas of high landscape and environmental

² The analyses were conducted using SPSS v.29 with the GENLINMIXED procedure, applying the Satterthwaite method for estimating degrees of freedom (DF_METHOD = SATTERTHWAITE). The model included a random intercept for the six municipalities, based on a sample of 607 respondents. All predictors were standardised (z-scores).

value (urban sprawl or spatial disorder), as well as concerns about typical criminal activities, including vandalism and burglary. The third factor addresses residential security and encompasses the perceived severity of issues such as vacant housing, a lack of social housing, and homelessness.

Tab 3. Rotated Component Matrix (Varimax Rotation). Source: authors' own elaboration

Variables	Factor		
	social	housing	spatial
The municipality is a safe and peaceful place	0.814	0.200	0.181
Satisfaction with the state of safety in public places	0.751	0.069	0.172
Satisfaction with relationships with the closest neighbours	0.700	0.208	-0.128
Lack of social housing (reverse-coded)	0.132	0.803	0.028
Perception of vacant housing (reverse-coded)	0.206	0.728	0.166
Threats of homelessness (reverse-coded)	0.172	0.719	0.390
Loss of attractive landscape or agricultural (reverse-coded)	0.267	-0.011	0.866
Spatial chaos and unlawful construction (reverse-coded)	0.272	0.023	0.779
Perception of vandalism and burglaries (reverse-coded)	0.281	-0.297	0.719

Note: Rotation converged in five iterations. The highest loading for each item (≥ 0.60) is highlighted in bold. The Kaiser–Meyer–Olkin measure confirmed sampling adequacy ($KMO = 0.775$), and Bartlett's test of sphericity was statistically significant ($\chi^2 (36) = 1596.82$; $p < 0.001$). The three extracted components accounted for a total of 66.0% of the variance (eigenvalues $\lambda = 3.44, 1.51, 1.00$).

Reliability coefficients were calculated for each factor, yielding values of $\alpha = 0.676$ for the first component, $\alpha = 0.759$ for the second, and $\alpha = 0.714$ for the third. These results indicate a satisfactory level of internal consistency across the measures. The highest mean scores were observed for the spatial dimension (4.67) and the housing dimension (4.64). Respondents were less likely to identify threats stemming from spatial disorder or housing-related issues. The social dimension yielded a slightly lower mean (4.07) and a wider dispersion of responses. This suggests that although neighbourly relations and the overall social atmosphere are generally perceived in positive terms, this area also reveals the greatest individual variation. A portion of respondents expressed concerns related to low levels of trust or limited social integration.

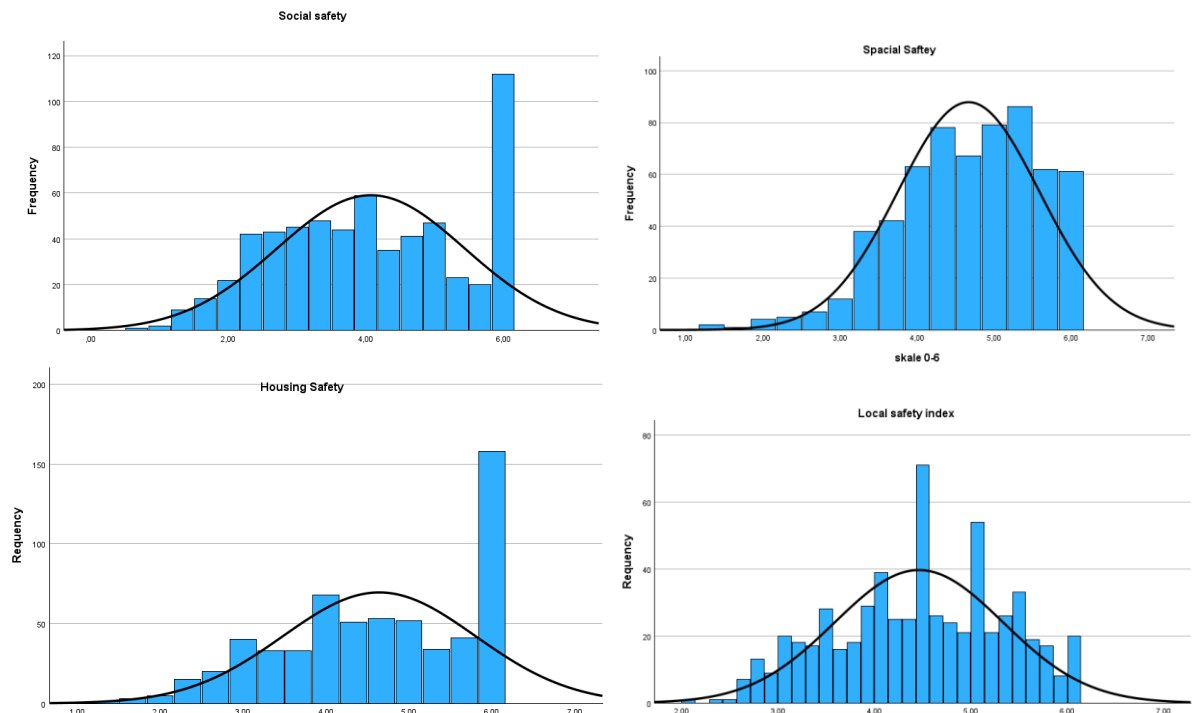


Fig. 1. Distributions of the social, housing, and spatial dimensions of local safety and the composite index. Source: authors' own elaboration

Note: All four distributions are unimodal, with a slight accumulation at the upper end of the scale.

The distributions of the three sub-dimensions, as well as the composite index of local safety, exhibit a unimodal structure approximating normality (see Figure 1). The summary index of perceived safety achieved a mean score of 4.46 with a standard deviation of 0.87 (scale: 0–6). Extremely low and high values were observed only in marginal proportions of the sample. This indicates a stable and moderately high level of self-reported safety within the studied population.

Descriptive parameters and visual inspection of the histograms confirm the validity of the adopted three-dimensional structure and justify the construction of a composite index based on a simple mean. At the same time, differences in mean values suggest that local safety is more sensitive to social factors than to spatial or housing-related aspects.

4.2 Social potential

The components of an individual's social potential included social capital resources, attachment to the municipality, sense of agency and willingness to act, as well as self-declared activity in the public, political, and social spheres. Social contact networks were identified for personal and informal purposes (see Table 4). Respondents reported the highest frequency of interactions with acquaintances (mean 7.99), followed by family members (6.23), and the lowest with close friends (4.80). The large variation in the number of acquaintances (indicated by high standard deviations) contrasts with a more even distribution of close personal ties. This network structure reflects both dimensions of social capital: a broad circle of loose connections (bridging) facilitates information flow, while stable family and friendship ties (bonding) provide emotional support.

Tab 4. Social circles (number of people). Source: authors' own elaboration

Social circle	Average	St. deviation	Minimum	Maximum
Further acquaintances	7.99	7.88	0	30
Family	6.23	3.65	0	30
Friends	4.80	3.49	0	100

Neighbourhood relations represent a distinct dimension of respondents' social ties. These interactions are predominantly limited to polite greetings, with respondents passing, on average, three neighbours with whom they exchange only brief salutations (3.21) (see Table 5). Private social events typically involve just one neighbour (0.99), while minor mutual favours or the lending of everyday items occur with approximately two neighbours (1.48). Respondents can identify by name and workplace an average of three individuals in their immediate vicinity (2.58), yet report engaging in joint initiatives with only one of them (1.10). Neighbourly social capital is primarily used for casual information exchange rather than the organisation of collective endeavours.

Tab 5. Span of neighbourhood circles by type of contacts (in persons). Source: authors' own elaboration

Neighbour's contacts	Average	St. deviation
Greetings	3.21	1.26
Private celebrations	0.99	1.08
Mutual favors	1.48	0.99
Knowledge of the neighbour, without personal contact	2.58	1.36
Cooperation	1.10	1.39

The highest levels of trust among respondents are directed toward family and friends (5.27), confirming the strength of bonding social capital (see Table 6). Moderate trust in neighbours (3.94) reflects bridging ties that support local cooperation. Trust in local authorities (3.03), generalised trust (3.18), and trust in

NGOs (2.98) remains around the midpoint of the scale, while trust in entrepreneurs is slightly lower (2.88). The lowest levels of trust are reserved for central institutions (2.41). A strong reliance on close personal relationships, moderate openness to neighbourly collaboration, and limited confidence in external (public or market-based) sources of support. This pattern may constrain the mobilisation of formal social resources.

Tab 6. Average levels of trust and approval of new residents. Source: authors' own elaboration

Variable	Average	St. deviation
Trust: family and friends	5.27	0.87
Trust: generalised	3.18	1.32
Trust: municipal authorities	3.03	1.38
Trust: NGO	2.98	1.46
Trust: neighbours	3.94	1.18
Trust: entrepreneurs	2.88	1.37
Trust: central institutions	2.41	1.47
Approval of new residents	3.49	1.76

Approval of new residents was assessed using a reversed item: the degree of disagreement with the statement that "*the influx of new residents worsens quality of life*." The mean score of 3.49 indicates moderate acceptance.

Subjective sense of attachment is understood as an emotional bond between the respondent and their place of residence (Lewicka 2011). Most respondents report a strong emotional connection to their municipality (4.26), although the high standard deviation suggests that some residents express only weak or moderate attachment (see Table 7).

Tab 7. Average values of civic attitudes of the respondents. Source: authors' own elaboration

Variable	Average	St. deviation
Attachment to the municipalities	4.26	1.64
Feeling of lack of influence	3.76	1.84
Objection to the decision of the municipal authorities	3.66	1.78
Willingness to co-decide	3.87	1.76

The analysis also focused on three dimensions of civic agency: perceived influence over local decision-making, readiness to oppose unfavourable municipal decisions, and aspirations to participate in co-governance. Respondents reported a moderate sense of influence over decisions made by local authorities, yet expressed relatively high readiness to take action and engage in shared governance (see Table 7). The mean reversed score for the statement "*people like me do not influence what the local authorities do*" (3.76) suggests that, on average, respondents tend to agree with this view. Nevertheless, their declared willingness to actively oppose unfavourable municipal decisions (3.66) is nearly at the same level. The highest average score was recorded for the aspiration to co-decide on important municipal matters (3.87).

The level of public engagement is generally low and varies between different forms (see Table 8). Participation in village fund meetings was reported by 22% respondents, 18% took part in the election of the village head. Only 10% had attended sessions of the municipal council, and 6% participated in ad hoc citizen committees. About 73% reported voting in the most recent local elections, indicating higher participation in basic democratic procedures than in collective action³.

³ For the analyses presented in the subsequent sections, a standardised index of public participation was constructed, comprising four variables ($\alpha = 0.73$). Voter turnout was examined separately, as its inclusion reduced the internal consistency of the index.

Tab 8. Social, public and political activity of the respondents (in %). Source: authors' own elaboration

Variable	Percentage of respondents
Voting in the last municipal elections	73
Inactivity in rural organisations	73
Participation in integration events (festivals, meetings)	57
Unpaid work for the village or municipality	24
Participation in the village fund meeting	22
Membership in 1 rural organisation	22
Participation in the election meeting of village leader	18
Participation in the session of the municipal council	10
Membership of the local committee (ad hoc)	6
Membership in 2 rural organisations	4.5
Membership in 3 rural organisations	0.5

In the context of social engagement, the analysis also examined respondents' membership in three of the most common types of local organisations in Polish rural areas: rural women's associations, volunteer fire brigades, and sports clubs. As many as 73% of respondents do not belong to any of these organisations, 22% are affiliated with one, 4.5% with two, and only 0.5% with all three. At the same time, 24% of respondents reported engaging in unpaid work for the village or municipality outside formal structures, representing a potential base of "active guardians" of local resilience. The most common form is involvement in local events (57%). This suggests the presence of strong, though informal, support networks that facilitate information exchange and strengthen social ties.

4.3 Sense of safety and social potential

To assess whether and which individual and contextual components of social potential influence rural residents' sense of safety, a two-level generalised linear mixed model (GLMM) with a random intercept (for municipalities) was developed (see Tables 9 and 10). For comparison, a single-level multiple linear regression (OLS) was also conducted, excluding clustering effects (see Appendix).

The first model incorporated a random intercept for each municipality, while simultaneously estimating the effects of individual-level predictors.

Tab 9. Multi-level model ($N_1 = 607$, $N_2 = 6$, no missing variables). Source: authors' own elaboration

Variable	β (stand.)	SE	t	p	95% CI
Constant	-0.001	0.176	-0.01	0.996	-0.456 ; 0.454
Approval of incoming	0.236	0.032	7.33	< 0.001	0.173 ; 0.300
Attachment to the municipality	0.154	0.037	4.21	< 0.001	0.082 ; 0.226
Co-management readiness	0.122	0.040	3.04	0.002	0.043 ; 0.200
Trust in the local authorities	0.232	0.048	4.79	< 0.001	0.137 ; 0.327
Trust in family and friends	0.172	0.035	4.94	< 0.001	0.104 ; 0.241
Trust in entrepreneurs	-0.121	0.040	-3.03	0.003	-0.199 ; -0.043
Age	-0.126	0.036	-3.53	< 0.001	-0.196 ; -0.056

Tab 10. Model Fit and Variance Components. Source: authors' own elaboration

Measure	Value
Marginal R ² (fixed effects only)	0.279
Conditional R ² (fixed + random effects)	0.464
Intraclass Correlation Coefficient (ICC)	0.256
Individual-level variance	0.524
Municipality-level variance	0.180 (SE = 0.119; p = 0.129)
-2 Log-Likelihood	1411.0
Corrected Akaike Information Criterion (AICc)	1415.0
Bayesian Information Criterion (BIC)	1423.8

Before the inclusion of individual-level variables, approximately 26% of the variance was attributable to the municipality level (ICC = 0.256). After accounting for individual-level predictors, fixed effects explained 27.9% of the variance, while the full model, including the random intercept, captured 46.4%. The municipality-level variance was not statistically significant ($p = 0.129$), indicating that differences between municipalities are primarily due to the composition of their residents. As such, interventions aimed at strengthening social capital, such as trust, participation, and support networks, are likely to be more effective than top-down measures. The improvement in model fit is further supported by a substantial decrease in information criteria values (AICc = 1415.0; BIC = 1423.8) relative to the null model.

Strong positive effects of trust in local authorities ($\beta = 0.232$) and willingness to engage in co-governance ($\beta = 0.122$) suggest that institutional agency and the openness of authorities to citizen participation can enhance residents' perceived safety. High levels of trust in family and friends ($\beta = 0.172$) serve as a key buffer in times of crisis, fostering resilience through networks of mutual support. Conversely, lower trust in the business ($\beta = -0.121$) may reflect concerns about economic dominance or perceived conflicts of interest in the local market. Emotional attachment to the municipality ($\beta = 0.154$) and a positive attitude toward the settlement of foreigners ($\beta = 0.236$) tend to coexist, indicating that openness to diversity does not undermine a strong sense of local identity. On the contrary, it may reinforce collective cohesion through the narrative of a "welcoming countryside."

The negative effect of age ($\beta = -0.126$) indicates that younger residents report a higher sense of safety. This may reflect their greater ability to access modern resources, such as information and technology, or a lesser burden of past critical experiences, such as the post-socialist transition. Above-average income, generalised trust in "most people," gender, and the presence of home surveillance systems do not contribute additional explanatory power once stronger predictors are accounted for.

The second model, based on OLS regression (see Appendix), explains 38% of the variance. The pattern of significant predictors aligns with the GLMM results, and the absence of the municipal-level variable in this model highlights the strong influence of individual characteristics and attitudes. In comparison to the multilevel model, the contextual influence of the municipality is not captured; however, individual-level differences account for a comparable share of variance (approximately 36%). This reinforces the conclusion that strengthening social capital, particularly by enhancing institutional trust, appears to be the most effective path toward improving collective resilience, even before addressing "hard" structural conditions at the local level.

The model supports the argument that the resilience of rural municipalities is primarily grounded in social ties and trust. A pro-migration orientation emerges as the strongest individual predictor of perceived safety.

5. Discussion

The analyses presented in this study have provided answers to the three guiding research questions. In response to the first question, we demonstrated that the sense of safety is a multidimensional concept encompassing social, spatial, and housing-related aspects. This perspective is consistent with the theories

of Ceccato (2015), Abraham and Ceccato (2022), Shucksmith (2018), Jarmoszko 2016). They argue that strong neighbourly relations enhance the feeling of safety. Furthermore, housing sociology highlights that residential stability and access to social resources reduce perceived threats and experiences of alienation (Forrest and Kearns, 2001). Our findings also show that subjective evaluations of safety levels are moderately high (above 4 on a scale of 0 to 6). The spatial and housing-related components received the highest ratings.

In addressing the second research question, we characterised the key variables that constitute social potential, both in terms of individual attributes of the respondents and the contextual features. Residents of suburban rural areas possess various forms of social capital. The predominance of family-based networks reflects the well-documented prevalence of bonding social capital in rural settings (Flora and Flora 2007). This network model reinforces emotional safety, but, as noted by Putnam (2000), it tends to limit the circulation of diverse resources. Although there is a potential for bridging, it has not yet been translated into sustainable actions at the community level that improve resilience, as conceptualised by Skerratt (2013). Even weaker is the linkage dimension of social capital. Trust in state institutions, NGOs, and the private sector falls noticeably below the midpoint of the scale. This lack of confidence in formal actors may hinder the mobilisation of external resources in times of crisis. Another distinctive feature is a relatively strong attachment to the municipality, which may, for instance, compensate for deficits in public service provision in rural areas by increasing residents' willingness to self-organise and offer mutual support (Sherrieb, Norris and Galea 2010).

Our findings confirm the paradox described by Wilson (2012): individuals feel a strong sense of local belonging but do not necessarily perceive themselves as partners in formal governance. Nevertheless, their declared willingness to participate in decision-making and to oppose unfavourable local policies indicates a latent potential for mobilisation. With the support of intermediary institutions, this potential could be activated in the process of building local resilience.

The most problematic issue remains the low level of participation in public life. This deficit of organisational social capital reduces the community's capacity for rapid, collective responses in the face of threats, a pattern well documented in rural crisis studies (Bański 2019). At the same time, high attendance at integrative events suggests that less formal channels remain active and may serve as entry points for deeper civic engagement. In practical terms, this highlights the need to invest in soft forms of local animation, such as municipal festivals or volunteering, which can gradually transform weak ties into more institutionalised forms of participation.

The study was conducted in suburban rural municipalities, where "newcomers" accounted for approximately 60% of the sample. The high share of newcomers helps explain the relatively extensive networks of weak social ties and the low incidence of strong neighbourhood bonds. While new residents bring broad bridging ties, they require time to develop bonding relationships with long-established families. Population heterogeneity contributes to the moderate levels of trust in municipal authorities and non-governmental organisations. Recent arrivals often lack familiarity with local institutions, which can limit their engagement and confidence in formal actors.

The co-occurrence of strong place attachment and limited participation in formal organisations reflects a transitional phase of "settling in" within the suburban landscape. From the perspective of resilience-building, this indicates that suburban municipalities must proactively establish platforms that promote integration between "newcomers" and "long-time" residents. Without such efforts, social capital is likely to remain fragmented, and the collective capacity to respond to crises may fall short of what the size of its networks and the declared attachment of residents to the place would otherwise suggest.

The residential environments (understood here as contextual potential) were internally diverse. They included both highly and sparsely urbanised municipalities, areas with dominant agricultural functions as well as those where such functions have been reduced, and units varying in size and population density. Nevertheless, these municipalities shared two important characteristics when compared to other rural areas in Poland: a positive net migration rate and notable developmental progression (Bański, 2008).

Regarding the third research question, we identified the factors that are of greater importance to the perception of local safety.

The Generalised Linear Mixed Model (GLMM) revealed that the most significant individual determinants of perceived local safety include openness to new residents, trust in municipal authorities, emotional attachment to one's place of residence, and the willingness to participate in the co-governance. Trust in family and friends functions as a "soft protective shield," providing support in times of crisis. In contrast, the negative coefficients for trust in entrepreneurs and for age suggest that scepticism toward the private sector, as well as an ageing population, may contribute to lower levels of perceived safety. Before including individual-level variables in the model, approximately 26% of the variation in perceived safety could be attributed to the residence ($ICC = 0.256$). After accounting for individual characteristics, the influence declined to 18% and was no longer statistically significant. This suggests that, within the context of our study, differences in perceived safety are primarily shaped by personal attitudes and social relationships, rather than by the administrative unit itself.

A comparison between the multilevel model and the classical OLS regression demonstrates that the primary determinants of the sense of safety are rooted in individual characteristics and social relationships, rather than in their administrative affiliation with a specific municipality. When controlling for social capital and local ties, the pattern of significant predictors remains virtually identical across both models, while the inclusion of the municipal level mainly enhances the precision of the estimation. Thus, the territorial-administrative context constitutes a relevant methodological consideration but plays a secondary role in terms of substantive interpretation. Differences between the GLMM and OLS results are expected: effects that appear significant in the single-level model (e.g., gender, income, surveillance, generalised trust) attenuate and become nonsignificant once random intercepts capture clustering by municipality, which removes composition-driven artefacts.

The nonsignificant between-municipality variance indicates that differences in perceived safety among residents stem primarily from individual resources rather than from divergent institutional contexts. This finding is consistent with conceptualisations of resilience that emphasise the key role of micro-level social capital resources – trust, neighbourly ties, place attachment, and willingness to engage in co-governance (Aldrich 2012; Aldrich and Meyer 2015). In the literature on suburban areas, it is argued that these forms of social capital often outweigh formal local structures, as residents draw on both local networks and extra-local ties resulting from proximity to the city (Bock 2016; Copus and de Lima 2015).

In dynamic suburban municipalities, individual mobility, access to urban services and social capital networks, as well as experiences acquired outside the municipality, may attenuate the impact of the local institutional context. The quality of local services and institutions thus plays a more limited role in shaping the subjective sense of safety. In such communities, contextual effects weaken because individuals are relatively independent of local resources. The absence of a significant contextual effect may therefore be typical of suburban municipalities of large cities, whose residents benefit from metropolitan resources, whereas in other suburban zones (e.g., highly fragmented or satellite areas with high in-migration and weaker local government infrastructure) the quality of institutions and access to services may exert a much stronger influence on perceived safety.

Simultaneously, research conducted in highly stressful contexts (conflict, war, or marginalisation) shows that it is social relations rather than institutions that most often constitute the foundation of resilience. For example, in Israeli communities exposed to rocket attacks, neighbourly ties and local support networks proved more important than institutional interventions (Shapira 2022), whereas in Ukrainian localities affected by war, trust and resident–authority relations were crucial for enabling everyday functioning and reconstruction (Akimova et al. 2025). Similar mechanisms, specifically, a lack of trust in "outsiders" and external institutions, have been shown to weaken resilience in communities affected by depopulation or natural disasters (Straub et al. 2024), whereas local leadership and bottom-up civic engagement strengthened adaptive capacities (Kumpulainen et al. 2022; Ham and Woolcock 2022).

These findings suggest that social resilience is founded on bonding ties, bridging and linking trust, and grassroots civic activity. The findings from suburban municipalities around Łódź fully conform to this

pattern, confirming that even in relatively stable, developing suburban areas, micro-level social resources remain key drivers of resilience, much as they do in contexts of conflict and marginalisation.

At the same time, the literature suggests that the strength of contextual effects increases in peripheral regions (Skerratt 2013; Magis 2010). The quality of local institutions, access to services, and the effectiveness of local government may more strongly differentiate perceived safety between peripheral municipalities. The absence of contextual effects in our study should therefore be interpreted as a feature specific to dynamic suburban municipalities, rather than as a universal characteristic of rural areas. The findings thus have the potential for generalisation, but primarily concerning suburban municipalities and communities. In peripheral regions, by contrast, one may expect a stronger role of structural factors as well as greater variation between municipalities.

From a resilience perspective, this implies that municipalities characterised by strong relational capital and a welcoming culture towards newcomers foster a sense of safety through perceived agency and support networks. The negative impact of age and native resident status suggests that older people or those deeply rooted in the locality may require targeted inclusion programs to ensure that they do not remain on the margins of local adaptation processes. Engaging the business sector in local dialogue could also help reduce social distance and transform these actors into allies in strengthening collective rural resilience. Nevertheless, although municipal variation proved to be statistically weaker, it may become more significant in areas facing deficits in public services. For this reason, we intend to pursue further in-depth comparative analyses in future research.

The authors acknowledge certain limitations of the study, including its cross-sectional design, the dependence on self-reported data, and the restriction of the sample to six municipalities within the metropolitan area. Despite these constraints, the findings provide compelling evidence that social diversity in suburban rural areas can serve as a vital asset for local development, provided it is properly recognised and strategically integrated into local policy frameworks. These limitations also point to natural directions for future research: longitudinal monitoring of changes in perceived safety and social networks, comparative analyses between suburban and peripheral municipalities, and in-depth qualitative studies aimed at better capturing the mechanisms of social capital mobilisation in times of crisis.

An additional limitation concerns the use of two types of statistical models (OLS and GLMM), which, although estimated on the same set of predictors, differ in how the results are presented. In the GLMM, only statistically significant predictors are reported, which may create an impression of asymmetry compared to the full set of variables displayed in the OLS model. We emphasise, however, that both models are based on the same data and the same set of fifteen predictors, and that the differences pertain solely to reporting conventions. Since the analysis relies on cross-sectional data, the interpretation is limited to co-occurring associations, without the ability to establish the direction of causality.

6. Conclusion

The article proposes and empirically tests a three-dimensional conceptualisation of local safety. The analyses draw on a representative survey of residents of six suburban rural municipalities in the Łódź Metropolitan Area. Factor analysis confirmed the existence of three coherent components (social, spatial and housing) and enabled the construction of a reliable index of local safety. The overall level of perceived safety proved to be moderately high, with the greatest variation observed in the social dimension. The application of a two-level Generalised Linear Mixed Model (GLMM) and OLS regression revealed that perceived safety is primarily associated with individual social capital, specifically trust in municipal authorities, trust in family and friends, place attachment, readiness for co-decision-making, and pro-newcomer attitudes. Once these factors are taken into account, between-municipality differences cease to be statistically significant. The findings suggest that in suburban municipalities, local resilience rests more on social capital resources and residents' attitudes than on the institutional context alone.

The theoretical contribution of this study lies primarily in the expansion of the concept of local safety by introducing a multidimensional framework comprising three interrelated indicators that reflect social,

housing, and spatial dimensions. Furthermore, we demonstrated that subjective feelings of safety are reciprocally linked to social capital. Although previous research has extensively explored safety concerns related to crime in both urban and rural contexts (Ceccato 2015; Abraham and Ceccato 2022), it has not systematically integrated these three dimensions of safety within a single analytical framework nor modelled their interaction with social capital. Earlier studies have shown that low levels of social trust exacerbate perceived threats (Ross, Mirowsky, and Pribesh 2001), local institutions and grassroots initiatives can foster trust and control over social space (Skerratt 2013), and that tensions between newcomers and long-term residents may undermine cohesion and the collective sense of safety (Blekesaune and Quadagno 2003). Our approach integrates these strands into a single, empirically tested model.

From an applied perspective, the findings underscore the importance of designing integration strategies that harness the organisational capacity of long-term residents while mobilising the skills and initiative of newcomers. Civil society actors should play a facilitative role in fostering trust-based links between these constituencies. In addition, national-level policies in the fields of public safety should reflect the specificities of suburban rural municipalities, which exhibit a distinctive configuration of social capital and shifting developmental needs.

In the context of the municipalities under study, it is worth considering concrete policy measures aimed at strengthening individual social potential. Examples include neighbourhood mentoring programmes that link residents of housing estates and villages, joint initiatives (such as local participatory budgeting schemes) that enhance willingness to engage in co-decision-making, and activities that animate micro-communities (e.g., neighbourhood initiative clubs). Such instruments can activate existing pro-integration attitudes while simultaneously strengthening trust and local resilience.

Acknowledgement

This research was supported by the Faculty of Economics and Sociology's #Eksocgrant programme, 2023 edition.

Ethical approval

This study used an anonymous, voluntary survey of adult rural residents and did not require formal ethical approval. It addressed non-sensitive topics: perceptions of rural life and local public and social institutions, and excluded vulnerable groups (e.g., minors), posing no physical or psychological risks. Participants were fully informed of the study's purpose and could decline participation or withdraw at any time.

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Appendix

OLS Regression Model. Source: authors' own elaboration

Predictor	B	Std. Error	Beta	t	p-value
(Constant)	4,08E-15	0,032		0	1
Trust in local authorities	0,307	0,048	0,307	6,365	<,001
Attitudes toward newcomers	0,293	0,034	0,293	8,626	<,001
Emotional attachment to the municipality	0,153	0,04	0,153	3,813	<,001
Willingness to engage in co-governance	0,136	0,039	0,136	3,462	<,001
Trust in family and friends	0,125	0,036	0,125	3,472	<,001
Contact frequency with immediate family	0,119	0,035	0,119	3,434	<,001
Private home security system	0,11	0,038	0,11	2,903	0,004
Social engagement level	0,082	0,036	0,082	2,249	0,025
Participation in local elections	0,073	0,035	0,073	2,092	0,037
Gender: Female	-0,066	0,033	-0,066	-2,003	0,046
Income above average	-0,089	0,037	-0,089	-2,409	0,016
Generalised trust	-0,098	0,044	-0,098	-2,22	0,027
Trust in entrepreneurs	-0,148	0,044	-0,148	-3,394	<,001
Age	-0,157	0,039	-0,157	-4,03	<,001
Born in the municipality	-0,158	0,035	-0,158	-4,486	<,001

Model Fit Statistics for the OLS Regression

Fit Measure	Value
R (Multiple Correlation Coefficient)	0.615
R ² (Coefficient of Determination)	0.378
Adjusted R ²	0.362
F(15, 591)	23.91 (p < 0.001)
Standard Error of the Estimate	0.799
Durbin–Watson Statistic	1.72