

Unraveling residential burglary trends in urban Mexico: The role of target accessibility, time and regional contexts

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ABSTRACT

This study aims to examine how contextual factors influence the risk of burglary victimization, specifically investigating whether time and regional effects shape these relationships. By analyzing data from the Mexican system of cities between January 2018 and June 2022 while controlling for population characteristics, we detected significant decreases in burglary risk among urban dwellers living in apartments and using restricted access mechanisms, although these effects are limited to certain regions. On the other hand, occupants of detached houses and those without restricted access mechanisms did not experience a reduction in burglary risk. These findings validate existing criminological theories emphasizing the importance of contextual factors. Moreover, our study underscores the necessity of further exploring why the downward decrease in burglary rates across cities came to a halt after the COVID-19 pandemic.

1. Introduction

Three theoretical perspectives have studied what makes some dwellings more suitable for burglary. These are Crime Prevention Through Environmental Design (CPTED), Routine Activity Theory (RAT), and the Rational Choice Perspective (RCP).

Target suitability refers to a combination of value, visibility, access, and inertia (weight of stolen goods) that make a target desirable for offenders (Cohen & Felson, 1979). The acronym VIVA (Value, Inertia, Visibility, and Access) in RAT has been used to summarize these factors and assess the risk of criminal attack (Felson & Clarke, 1998; Vakhitova et al., 2022). In CPTED, target suitability is determined by factors such as territoriality, visual natural surveillance, and image and milieu (i.e., social environment, (Jeffery, 1971; Newman, 1972). Similarly, the RCP considers various elements of the dwelling along with neighborhood context that contribute to its suitability for burglary, including affluent detached homes with larger gardens, etc. (Cornish & Clarke, 2014; Vandeviver & Bernasco, 2019). By considering different aspects of target suitability, these perspectives complement each other and converge in others.

Numerous studies have examined the link between target suitability and burglary victimization using different aspects of accessibility, such as the type of dwelling and the use of restricted access mechanisms. With

regards to the type of dwelling, most evidence indicates that detached dwellings are more vulnerable to burglary compared to semi-detached and terraced dwellings, as well as low-rise or high-rise apartment buildings (Bernasco & Nieuwbeerta, 2005; Coupe & Blake, 2006; Hunter et al., 2021; Montoya et al., 2016; Peeters et al., 2018; Townsley et al., 2016; Tseloni et al., 2010, 2018; Tseloni & Thompson, 2018; Vandeviver et al., 2015; Vilalta & Fondevila, 2021). With regards to the use of restricted access mechanisms, including gated communities, most evidence also indicates they effectively reduce burglary victimization (Addington & Rennison, 2015; Atlas & LeBlanc, 1994; Bernasco & Luykx, 2003; Bernasco & Nieuwbeerta, 2005; Branic & Kubrin, 2018; Wang et al., 2021).

Yet, there are important exceptions to this body of evidence. One study in the UK found that flats in apartment buildings were at a higher risk of burglary compared to detached and semi-detached houses (P. Cozens et al., 2002), while another study in Seattle, USA, revealed that neighborhoods with taller buildings tend to experience more residential crime incidents (Sohn, 2016). The exception of restricted access mechanisms is discussed in the context of South Africa, where a higher incidence of burglary victimization was found within gated communities (Breetzke & Cohn, 2013). Moreover, the evidence presented is also subject to limitations such as its heavy reliance on cross-sectional data and case-study designs, which assume that correlations remain constant

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over time and place.

These exceptions and limitations are important because are symptomatic of two issues. One is the lack of data suitable for between and within cities analyses. This issue results in reduced generalizability and difficulty in identifying trends. Another issue, that we seek to investigate in this study, is the influence of context on shaping theoretical relationships. Both the CPTED and RAT recognize the significance of urban contexts in influencing theoretical connections. However, there is a lack of sufficient examination of the distinctions between compositional effects (such as sociodemographic categories) and contextual effects (such as time, city, region, etc.). The claim of contextual mechanisms in theories emphasizes the need for a thorough study of these contextual effects. Notice that contextual effects are those that emerge from interactions between individuals and their social environment. Context should not be viewed as a mere summation of individual characteristics in geographic areas, nor are contextual effects simply the outcome of time or territorial divisions, or the grouping-effects observed in multilevel studies. Contextual effects are substantive effects as theoretical relationships are shaped by the interaction between the individual, place, and time (Vilalta, 2013).¹

This study contributes to the international literature on burglary by empirically showing how the association between dwelling type, restricted access, and residential burglary victimization varies over time and in different cities and regions. Our data comes from a survey conducted in the Mexican system of cities over a period of five years. Our findings present robust evidence of substantial interaction effects between burglary victimization, time, place, dwelling types, and restricted access, highlighting the significant role that context plays in influencing the strength and direction of theoretical relationships. These results confirm that theoretical relationships have to be contextualized in time and place to accurately explain patterns of victimization.

After this introduction, this study is divided into four parts. In the first part, we review the theoretical and empirical links between burglary and target accessibility. In the second part, we discuss the contextual aspects and predictions of each theory and how contextual effects have been operationalized. Here we make the argument that contextual effects are neither the summation of compositional characteristics in geographically aggregated units of information nor are evidenced by the spatial clustering of burglary victimization or by the grouping effects in multilevel analyses. Instead, contextual effects arise from the interaction of compositional characteristics within different locations over time and space. This interaction influences the relationship between these characteristics and the occurrence of burglary victimization. To examine the theoretical mechanisms of the context, it is necessary to conduct empirical tests that elucidate moderation effects. Next, we present the data, measures, and analytical strategy we use to examine how time and place moderate the relationships between target accessibility and burglary risk across the Mexican system of cities between 2018 and 2022. In the fourth part, we present the results of our statistical analyses. In the fifth and final part, we offer a summary and discuss the implications of the findings for future research.

2. Burglary and target accessibility

Target accessibility is a risk factor for burglary that the three perspectives take into account. For instance, CPTED takes into account target accessibility by altering crime opportunities via the control of entry and exit access points, RAT does it also via the modification of crime opportunities, and RCP via the offender's rational calculation. Notice that RAT's target accessibility also affects RCP's assessment of risk, as less accessible dwellings take more time to attack and increase burglars' risk of detection. Similarly, Newman's notion of defensible

space in CPTED, which itself encompasses different dwelling design elements (territoriality, surveillance, image, and geographical juxtaposition)² connects with RAT's accessibility and visibility elements of target suitability and RCP's elements of risk and effort.

Notice, however, that concerning agency and rationality, while RCP assumes offenders as rational actors, RAT does not as behaviors may be opportunistic and spontaneous, and CPTED proposes that features of the physical environment feed into the offender's target selection decision-making process. Thus, while CPTED emphasizes cues of territoriality surveillance and access control to create defensible spaces by design, RAT emphasizes altering target suitability by increasing capable guardianship, and RCP emphasizes the need to increase perceived risks and effort while reducing potential rewards.

The differential effects of the RCP elements (i.e., effort, risk, and reward) and RAT's visibility and accessibility components as a frame of reference in the burglar's target selection process cannot be easily separated from one another and point to theoretical intersections.³ For example, in RCP terms, it is reported that detached houses not only are comparatively more accessible than flats but may also be perceived as more suitable as they are typically more expensive and thus may provide higher rewards (Bowers et al., 2005; P. Cozens et al., 2002). Likewise, dwellings in gated communities may increase perceived effort and risk, but may also increase the perceived rewards (Breetzke & Cohn, 2013).

In this regard, previous studies have pointed out the vulnerability of different housing designs. For example, burglars tend to prefer detached houses and properties near the ends of streets as they provide less visibility for them to be detected (Maguire & Bennett, 1982). Most evidence is that detached dwellings as compared to semi-detached, terraced dwellings, and flats (either low-rise or high-rise apartment buildings), have significantly higher levels of burglary (Bernasco & Nieuwbeerta, 2005; Coupe & Blake, 2006; Hunter et al., 2021; Montoya et al., 2016; Peeters et al., 2018; Townsley et al., 2016; Tseloni et al., 2010, 2018; Tseloni & Thompson, 2018; Vandeviver et al., 2015; Vilalta & Fondevila, 2021). The explanation put forward is that detached dwellings have higher accessibility (more entry points). One exception already mentioned was presented by Cozens et al. (2002) in Britain, who found that flats in apartment buildings were (in the opinion of burglars, planners, and police officers) more vulnerable to burglary than detached and semi-detached houses.

Restricted access reduces the target's suitability by increasing by RCP's effort and risk of offending (P. Cozens & Love, 2015). Increased difficulty of access to the dwelling also reduces the target's suitability (Peeters & Vander Beken, 2017). Access controls may have been incorporated into the dwelling either by design (e.g., luxury gated communities with CCTV security systems) or implemented afterward (e.g., the closing of streets with or without security booths).

Evidence in this area of study is rich in different types. Studies have made use of interviews of burglars (P. Cozens et al., 2002; Cromwell et al., 1991), dwellers (Shaw & Gifford, 1994), police officers (P. Cozens et al., 2002), planners (P. Cozens et al., 2002), or different combinations of the previous (P. Cozens et al., 2002), as well as police reports of burglarized households and/or offenders (Bernasco & Nieuwbeerta, 2005; Breetzke & Cohn, 2013; Hino & Amemiya, 2019; Langton & Steenbeek, 2017; Townsley et al., 2015, 2016; Tseloni & Thompson, 2018) including inside gated communities (Wang et al., 2021) or census

¹ See also Bottoms and Wiles chapter "Explanations of Crime and Place" for a detailed discussion of Giddens's structuration theory.

² Territoriality means making it clear who owns the space using both real and symbolic barriers. Surveillance refers to designing buildings in a way that allows residents to watch over things with strategically placed windows and entrances. Image and milieu refers to creating an environment that feels well-maintained in order to promote positive perceptions of the place. Geographical juxtaposition looks at how surrounding spaces can have an impact on security for adjacent areas by hindering criminal activity (P. Cozens & Love, 2015).

³ It is questioned even if burglars are more rational than opportunistic (Cromwell et al., 1991).

blocks inside gated communities (Branic & Kubrin, 2018), or aggregated at the neighborhood level (Yue & Zhu, 2019), samples of burgled, non-burgled houses and residences (Langton & Steenbeek, 2017; Montoya et al., 2016; Peeters et al., 2018; Vandeviver & Bernasco, 2019), households or victims surveys (Coupe & Blake, 2006; Hunter et al., 2021; Tseloni et al., 2004; Vilalta & Fondevila, 2021; L. Zhang et al., 2007) or police officers surveys (Coupe & Blake, 2006). Others have assessed target suitability among samples of non-burglars via virtual reality techniques (Park & Lee, 2021).

Many studies compress yearly data into cross-sectional data sets (Bernasco & Nieuwebeerta, 2005; Branic & Kubrin, 2018; Breetzke & Cohn, 2013; Hino & Amemiya, 2019; Townsley et al., 2015; Vandeviver & Bernasco, 2019; Wang et al., 2021; Yue & Zhu, 2019) while others fit the data via multivariate regression of separate survey waves as they cannot be combined (Tseloni & Thompson, 2018). Although short time-period averages are used to account for “idiosyncratic fluctuations in crime levels between years” (Branic & Kubrin, 2018), one would still question whether burglar's target suitability assessments are time stationary or not and whether effect sizes are the same over time, particularly if long-term data is available (Hino & Amemiya, 2019; Peeters et al., 2018; Vandeviver & Bernasco, 2019).

Briefly put, although, with different focuses and explanations about offender's target selection process, these perspectives explain that target accessibility affects opportunities for burglary by increasing the perceived and/or actual risk and effort.

3. Theories and contextual mechanisms

CPTED, RAT, and RCP propose theoretical relationships that are contextually structured, where time and place are not containers of human agency, but intrinsic to it. Next, we point out the explanatory mechanisms in each theory that constitute such contextual arguments, focusing on the theoretical relationship between target suitability and burglary victimization.

We begin by reminding the reader that CPTED asserts that behaviors can be controlled through urban planning and design for both safety and social cohesion (Angel, 1968; Jacobs, 1961; Jeffery, 1971; Newman, 1972, 1973). While CPTED has undergone several operationalizations (P. Cozens & Love, 2015; P. M. Cozens et al., 2005), the argument that dwelling design impacts offender decision-making processes in assessing target suitability has remained the same. CPTED proposes four target suitability elements to discourage unlawful activities: Increased visibility, natural surveillance, access control, and territoriality.

RAT states that three key elements must converge for a predatory crime to occur: A motivated offender, a suitable target, and the absence of capable guardianship (Cohen & Felson, 1979). It explains that target suitability components (i.e., value, visibility, accessibility, and inertia)⁴ and capable guardianship alter the probability of direct-contact crimes and can explain crime trends (Cohen & Cantor, 1980; Cohen & Felson, 1979). Finally, the RCP was imported into criminology to examine how criminals engage in a logical decision-making process, by which they weigh the benefits (e.g., monetary rewards) and costs (e.g., arrest and punishment) of committing a crime before taking action (Cornish & Clarke, 1987, 2002, 2014).

These theories present contextual arguments. RAT is the most explicit in this respect and thus we begin our review with it. Cohen and Felson (1979) argued that urban societal changes in the US between the forties and the sixties affected the trends in the structure of routine activities (e.g., work patterns and leisure activities) and therefore shaped

crime opportunities. Furthermore, they argued that increases in crime opportunities undermined society's institutions (e.g., the justice system, community, and family) capacity to exert social control.

We find two contextual mechanisms operating in RAT. First, societal changes in routine activities seem to interact with the agency of offenders, victims, and guardians. Namely, when routine activities change, there are also shifts in the availability and suitability of targets, for example, in terms of different dwelling designs and types of restricted access, to which burglars have to strategically adapt. Victims, also, become exposed to different risks depending on these major societal changes (e.g., commuting or teleworking), to which they also adapt making lifestyle choices to mitigate such new risks. Guardians have to adapt to both the victim's routine and lifestyle shifts and offenders' strategic adaptations, including how they exert social controls. Notice, however, that not all societies go through the same societal changes. Second, as societal changes affect the capacity of the family and the community in their role of exerting social control, they become less relevant against the “... vast increases... of rewards to be gained from illegal predatory acts” (Cohen & Felson, 1979, p. 605). Another aspect of the interactive relationship between target suitability and burglary risk is that previous changes in agency promote structural changes in urbanization patterns as evidenced by the rise of gated communities, closing of streets, residential segregation, new dwelling designs, etc.

CPTED focuses directly on dwelling designs and urban planning, making a strong case for contextual effects. First, notice that CPTED is strongly rooted in the principle of the defensible space, that is, “...the range of mechanisms—real and symbolic barriers, strongly defined areas of influence, and improved opportunities for surveillance—that combine to bring an environment under the control of its residents” (Newman, 1972, p. 3). Simply put, the argument is that different features of building designs and housing projects combine to create areas “... for which people will adopt concern...” (p. 206) and thus safety. These features are to provide territoriality (i.e., the capacity of the physical environment to create perceived zones of influence), natural surveillance (i.e., the capacity of the physical design to provide surveillance opportunities for residents and their agents), and image and milieu (i.e., the capacity of design to positively influence the perception of places). As these features result in “bringing neighbors together” (p.2) for intervention, we see here how CPTED intends a structuration of behaviors. The contextual mechanism in this case is the appropriation of the place and the configuration of social dynamics via urban planning and dwelling design. In CPTED, the compositional mechanism comes second after context, by stating that “poorly designed buildings and projects have crime rates as much as three times higher than those of adjacent projects housing socially identical residents at similar densities” (p. 7).

While the RCP focuses on the offender's decision-making processes which are determined by three factors, namely, effort, risk, and reward (Cornish & Clarke, 1987, 2002, 2014), they cannot be separated from the context as offenders are self-consciously responsive to it in their estimation. The contextual or interaction process in RCP can be explained from the RAT and CPTED in the following way: As changes in routines and dwelling designs affect target suitability, offender's perceptions of effort, risk, and rewards are altered resulting in either the distance, relocation, or innovations in their *modus operandi*.

There is indirect evidence that the context interacts with offenders' assessment of target suitability. For example, the RCP's expected reward element proxied by occupation and formal schooling of dwellers has been found to increase burglary risk (Bennett & Wright, 1984; Maguire & Bennett, 1982; Vandeviver et al., 2015) as burglars seem to prefer wealthy households over poor ones because of expected higher rewards (Bennett & Wright, 1984; Nee & Meenaghan, 2006; Townsley et al., 2016), as well as affluent neighborhoods over deprived ones as they may contain more dwellings with valuable goods (Bennett & Wright, 1984; Bernasco & Nieuwebeerta, 2005). However, one case study in the UK found that detached houses in deprived neighborhoods were more likely

⁴ “Potential offenders are thought to view the suitability of targets in terms of their worth (i.e., monetary or subjective value to the offender), how easily the offender can approach the target without being discovered, and the ease with which the target can actually be acquired once assessed” (Cohen & Cantor, 1980, p. 143)

to be burglarized (once or repeatedly) than similar dwellings in affluent neighborhoods (Bowers et al., 2005), suggesting that neighborhood cues of expected rewards interacted with burglar's assessment of the target's suitability (Bowers et al., 2005; Ward et al., 2014). Likewise, another study in the UK found that dwellings in more affluent areas were more likely to suffer from more near repeats, whereas dwellings in less affluent areas suffer more direct repeated burglaries (Johnson & Bowers, 2004). So, while burglars may prefer wealthy households over poor ones for their expected higher returns (Bennett & Wright, 1984; Nee & Meenaghan, 2006; Townsley et al., 2016), correlations must be controlled for by contextual mechanisms (e.g., social control, territoriality, image and milieu, etc.)

One contextual mechanism in burglar's assessment of the risk of detection according to RCP is social cohesion and informal social control (D. Reynald, 2010; D. M. Reynald, 2018). Some studies have tested whether neighborhood social cohesion proxied by residential mobility correlates independently with burglary risk and found no statistical association (Townsley et al., 2015), although one did find such a correlation for the case of census blocks containing gated communities (Branic & Kubrin, 2018).

Gated communities are distinctive dwelling designs characterized by strict access control mechanisms (Breetzke & Cohn, 2013). Gated communities are expected to reduce burglary risk by reducing accessibility into the community and increasing the visibility of potential burglars. By restricting access, controlling entry and exit points, and using security personnel (in some cases), gated communities impact RCP's perceived efforts and risk altering their selection process. Some studies in the US show that burglary victimization in gated communities is significantly lower than counterparts in non-gated communities (Addington & Renison, 2015; Branic & Kubrin, 2018), while others find no significant differences in crime rates (Wilson-Doenges, 2000). In one South African city, gated communities showed to have higher burglary rates compared to non-gated communities (Breetzke & Cohn, 2013), suggesting that the city context matters.

Concerning context, previous studies have operationalized it in quite different ways evidencing a wide variety of interpretations of what it is. Some studies have understood context as the timing and modus operandi of burglars (Garofalo & Clark, 1992), while others have understood it as different nations and cities (Hodgkinson & Andresen, 2019; Vandeviver & Steenbeek, 2019), in addition to different periods (Vandeviver & Steenbeek, 2019). Some have understood context in terms of the spatiotemporal clusters of burglary (Rey et al., 2012) and others have understood compositional characteristics of places as contextual characteristics of places (Malczewski & Poetz, 2005; H. Zhang & McCord, 2014; H. Zhang & Song, 2014). However, notice that the context is not the summation of an individual's characteristics in census units of information (census tracts) or analysis (neighborhoods). Contextual effects result from the interaction between the individual and the social environment, meaning that theoretical relationships are socially structured.

A few studies have explored the so-called social ecology of burglary, that is, the interdependence between individuals and their environment (physical, social, and cultural) (Fissel & Wilcox, 2021). These studies have shown evidence of the effect of social ties and social informal controls on opportunities for burglary across levels of analysis (Nobles et al., 2016; Ward et al., 2014; Wilcox et al., 2007) while controlling for, among other things, the compositional characteristics and physical layout of places. However, again, contextual effects are not the result of individual's grouping-effects but the product of social interaction which seem to vary from place to place and time to time.

In this study, we argue that one possibility for advancement is to examine whether trends in theoretical relationships are shaped by time and place, whereby the two latter are moderating factors in the relationship between target accessibility and burglary risk (see Fig. 1 below). To our knowledge, no prior study has attempted to address this gap or examine this relationship across a system of cities much less over

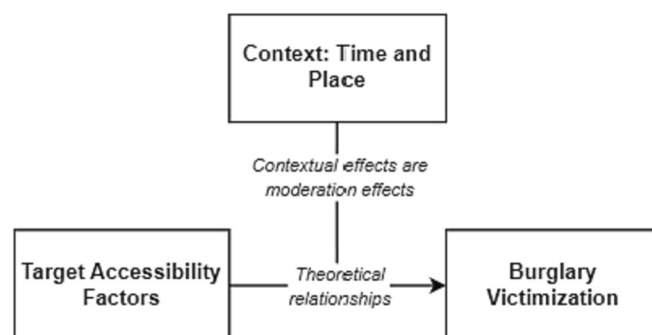


Fig. 1. Diagram of contextual effects as moderation effects in theoretical relationships.

five years. Our dataset presents an opportunity to do so. We explain in the next section our data, measures, and analytical strategy.

4. Data, measures, and analytical strategy

4.1. Data and measures

We rely on the household-level data from the Mexican National Survey of Urban Public Security (ENSU) to examine whether trends and regional differences in household reports of burglary victimization are associated with the type of dwelling and the availability of a barrier to the main entrance to the dwelling. We take advantage of a large sample of adult residents in 94 urban areas across nine waves of the ENSU survey conducted between June 2018 and June 2022.⁵ The INEGI has conducted the ENSU survey since 2016 on a three-month basis (March, June, September, and December), however, victimization measures started to be collected in June of 2018 and are collected only in June and December. Notice that because of the COVID-19 pandemic, the June 2020 wave was conducted until September of the same year, however, the victimization question refers to the first six months of the year. It is important to mention that the COVID-19 national emergency was declared between March and April 2020. During this month, most economic activities were brought to a halt. The national emergency could have had some effect on burglary risk during and after 2020, however, this emergency cannot explain the reducing trend for the entire period since 2018 (see Fig. 2). The proportion of burglarized households has remained within the margin of error since the June to December 2020 semester, suggesting that the decreasing trend came to a halt after the pandemic.

The ENSU asks adult respondents whether their household was burglarized or attempted to burglarize with a binary response (Yes = 1, No = 0). Before conducting the survey, interviewers assess whether the respondent lives in a detached house, apartment in a building, tenement dwelling, rooftop dwelling, or other types of spaces not designed for housing (e.g., warehouses, workshops, barns, etc.) We condensed the five categories into two, distinguishing detached houses from dwellings in apartments, tenements, and rooftops (house = 0, apartment = 1) –residents of spaces not designed for housing were not included in the analysis.⁶ Before the interview, interviewers also assess whether the dwelling has any sort of physical barriers, such as a security booth, doors with or without audio or video intercommunication, a doorman, or any other barrier that restricts access to the main entrance of the dwelling. Possible answers are binary Yes/No (Yes = 1, No = 0). We used these

⁵ Our database covers data from 94 distinct urban areas including Mexico City municipalities, which were being grouped into four different regions until December 2019 when municipality representative samples began to be collected.

⁶ These account for 0.02 % of the total adults surveyed.

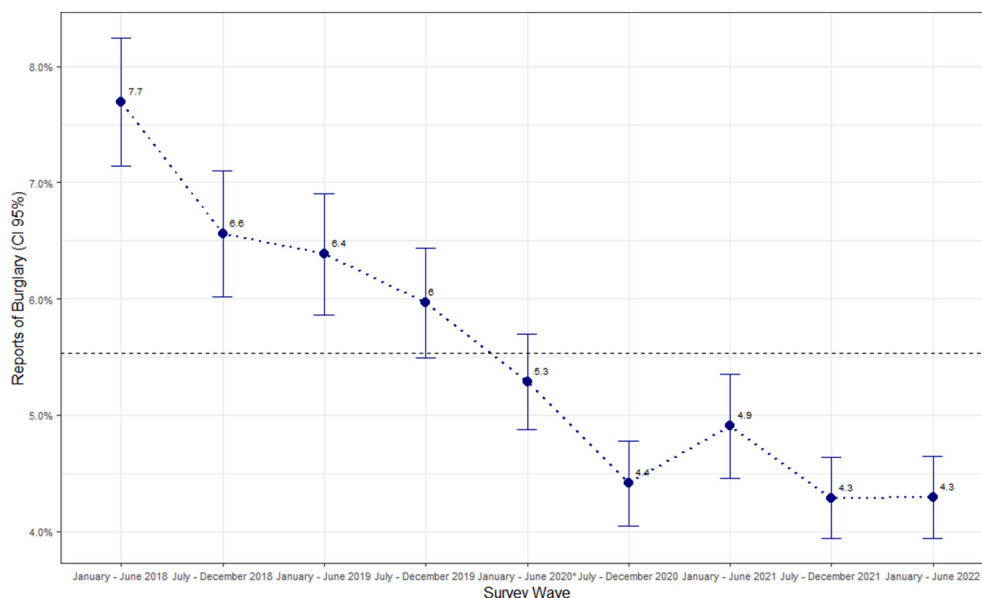


Fig. 2. Urban Mexico: reports of burglary by survey wave (June 2018 to June 2022).

Note: Estimates based on each ENSU wave expansion factors. The dotted horizontal line represents the average for the entire period.

two variables as indicators of target accessibility (see Table A1 in the Appendix).

We included as control variables different predictors of burglary reported in previous studies. Household size was included as a proxy measure of guardianship (Soo Chon, 2017; Tseloni, 2006; Vilalta & Fondevila, 2021). We recorded this measure to be binary comparing those not living alone with those living alone (No = 0, Yes = 1). Level of formal schooling (None = 1, Basic = 2, High-School = 3, University = 4) and occupation (Not worker = 1, Temporal = 2, Employee = 3, Self-employed = 4, Employer = 5) were included as proxy measures of dweller's level of income and thus expected rewards (Bennett & Wright, 1984; Chen et al., 2017; Nee & Taylor, 2000; Rengert & Wasilchick, 2000; Townsley et al., 2015; Tseloni et al., 2004; Vilalta & Fondevila, 2021). Report of conflict with neighbors (No = 0, Yes = 1) was included as a proxy measure of informal social control (Peeters et al., 2018; D. Reynald, 2010; D. M. Reynald, 2018; Vilalta & Fondevila, 2021). One recent study on residential burglary in Mexico finds that conflict with neighbors is the strongest correlate of residential burglary (Vilalta & Fondevila, 2023), while another did not find such a correlation (Vilalta & Fondevila, 2021). Respondent's sex (Male = 1, Female = 1) and age are often used as demographic controls (Bernasco et al., 2017; Bernasco & Nieuwebeerta, 2005; Clare et al., 2009; P. Cozens et al., 2002; Nilsson & Estrada, 2006; Soo Chon, 2017; Vilalta & Fondevila, 2021; Wilcox et al., 2007), however, age was not included in our models as it would not allow them to converge to a solution (after trying with different transformations). Descriptive statistics are presented in Table A1 of the Appendix.

4.2. Analytical strategy

Since apartment buildings have comparatively less accessibility (entry points) than detached houses, our first expectation is that the former will suffer from a lower probability of residential burglary. Our second expectation is that, independently of the type of dwelling, those with restricted accessibility will have a lower probability of burglary as compared to their counterparts. We test whether these expectations hold consistently over time independently of the unobserved characteristics of the regional context. We nested the 94 urban areas in the ENSU in eight different regions (see Map in Fig. 3). These regions are traditionally used in urban and regional studies in Mexico (Garza & Schteingart,

2010). The regions with the highest percentage of households victimized by burglary have been the Center-West, Northwest, and North, which together create a contiguous cluster. Notice however that there are very significant differences in the regional trends (see Fig. 4). Between June 2018 and June 2022, there were significant reductions in burglary in five regions (Northwest, Northeast, Center-West, Center-East, and South), and no significant changes in the other three (North, East, and the Peninsula).

These time and place variations do not constitute evidence of contextual effects but suggest there may be unobserved contextual characteristics of time, city, and region that contribute to household-level probabilities of burglary. In addition, due to the survey design, we need to control for the possible autocorrelation of burglary reports over time within urban areas. Consequently, to assess and control for unobserved time and regional heterogeneity, we estimated a complementary log-log regression with fixed and random effects of time and urban areas in regions. More in detail, we estimated fixed and random effects of time and random intercepts of urban areas nested within regions. We fitted the data with the “complementary log-log” function, given that burglary is a binary variable with low frequencies, which became even lower over time. This function provided better results than the traditional logit.⁷ Likewise, the previous combination of fixed and random effects had an estimable covariance structure and offered converging models with the highest predictive accuracy among the different alternatives tested.

Four models were tested: Two means models and two growth models. Model 1 is an unconditional (no predictors) means model directed to assess the amount of variation due to unobserved within-cities variability over time, between-cities variability, and region-to-region variability. Model 2 is an unconditional growth model that only incorporates time as a fixed and random effect to estimate within-city variability controlling for time, between-city nested regions

⁷ The complementary log-log (*cloglog*) transformation ensures asymptotic behavior at both ends of the distribution and rapidly approaches to zero as linear predictors become smaller. The complementary link function is estimated as follows: $g(p) = \log(-\log(1 - p))$, where $g(p)$ is the transformed value of the linear predictor and p is the probability of the response variable in one category (e.g., victim of burglary). We compared the *cloglog* estimates with the *logit* estimates and the former provided better fit to the data in all models.



Fig. 3. Urban Mexico: burglary victimization by region (June 2018 to June 2022).

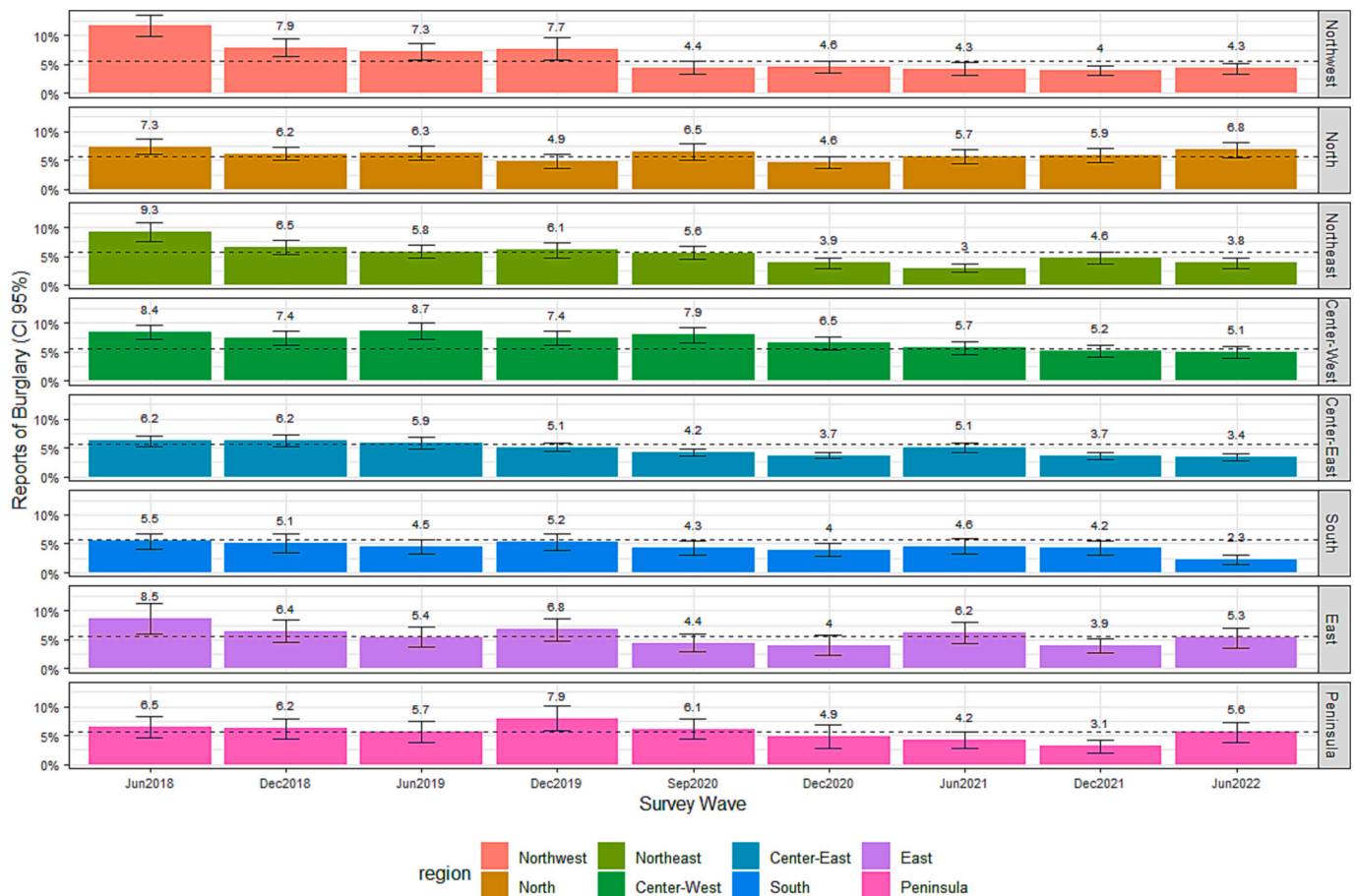


Fig. 4. Urban Mexico: burglary reports by region over time (June 2018 to June 2022).

Note: Estimates based on each ENSU wave expansion factors.

variability, and variability in rates of change in burglary reports between cities from the same region. Model 3 replicates model 1 only with control variables and Model 4 replicates Model 2 with control variables.

Data analyses were conducted in R (v. 4.2.2) with the *glmmTMB* (v.

1.1.5) package (Brooks et al., 2023), the *performance* (v. 0.10.3.4) package (Lüdtke et al., 2021), the *ggeffects* (v. 1.1.4) package (Lüdtke, 2018), and the *ggplot2* (v. 3.4.2.) package (Wickham, 2009). All analyses were conducted using the ENSU weighted samples. Statistical

significance levels for confidence intervals were set at $p < 0.05$.

5. Results

Based on our review of theories and previous studies, we expected lower probabilities of burglary victimization among apartment dwellers with restricted access to the main entrance of the dwelling. The results of the four regression models are presented in Table A2 in the Appendix. Table 1 below shows the results of the ANOVA type III Wald's tests which indicate how much each predictor contributes to the model while controlling for the other predictors. Here can see that all theoretical correlates significantly add to the burglary variation except for the regional variable in Model 4, meaning that once the conditional growth model controlled for within-city variability, the regional context did not add explanatory capacity as a fixed effect or a predictor assumed to have constant average effects on burglary. This is important because it suggests that the regional context does not shape the theoretical relationships between household compositional correlates of burglary victimization and the latter once we control for the clustering effects of cities within regions.

Depicted in Fig. 5 are the effects that apartment dwellings and restricted access in their interactions with time have on the predicted probabilities of burglary. We can see that the decreasing trend in burglary victimization was not conditioned by the type of dwelling and restricted accessibility. On average, between June 2018 and June 2022, neither the type of dwelling nor restricted access made a significant difference in burglary victimization. Burglary victimization has consistently been within the margin of error for both dwellers in detached houses and apartments, as well as for dwellers with and without restricted access mechanisms. In this sense, the first main finding is that, on average, we have no evidence to link burglary victimization trends with the type of dwelling or restricted access mechanisms.

The second main finding is that both factors, type of dwelling and restricted access, have consistently shown similarly adjusted probabilities of burglary (see Fig. 5 again). What this means is that neither is superior in predictive capacity.⁸ We tested for a joint effect of the two on burglary risk and found that the interaction term was not statistically

Table 1
ANOVA type III tests: models 1 to 4.

	Model 1: unconditional means	Model 2: unconditional growth	Model 3: conditional means	Model 4: Conditional growth
Intercept	9066.1**	558.9**	1916.2**	249.7**
Time		18.4**		17.5**
Apartment × time				3807.1**
Restricted access × time				12,035**
Apartment Restricted access			27,826** 103,960**	1089.4** 6083.5**
Live alone			5842.1**	7199.8**
Schooling			35,795**	33,028**
Occupation			278,520**	284,430**
Conflict w/ neighbors			2,172,200**	2,112,600**
Female			4881.7**	5362.1**
Region			37.9**	12.5

* $p < 0.05$.

** $p < 0.01$.

⁸ We followed up examining whether there was an interaction effect between the two however it was not statistically significant, that is, inconclusive on whether this interaction effect is probabilistically different from zero.

significant, meaning that their combination did not seem to impact the probability of burglary. Notice, however, that over time, the average predicted probabilities of burglary decreased more for apartments than for house dwellers ($5.9/3.1 = 1.90$ and $5.5/2.4 = 2.29$ respectively). Also, the differences in their average probabilities have increased over time ($5.9/5.5 = 1.07$ and $3.1/2.4 = 1.29$ respectively). The same can be observed in the case of dwellers with restricted access and their counterparts. So, although there is no evidence that the observed trend is, on average, associated with the type of dwelling or restricted access mechanisms, this does not mean that if the trend continues downward, differences in the probabilities of burglary between different dwelling designs will not begin to show up.

Exploring further whether the interactive effects of time on the relationship between type of dwelling and restricted accessibility and burglary risk varied across regions, we found that apartment dwellers in the Northwest, North, Northeast, Center-West, and Center-East regions decreased their burglary victimization risk significantly between 2018 and 2022 –this was not the case for apartment dwellers in the cities of the South, East, and Peninsula regions (see Fig. 5). Also, the probability of residential burglary among detached house dwellers in all regions remained within the margin of error between 2018 and 2022. Similarly, urban dwellers with restricted access mechanisms in the Northwest, North, Northeast, Center-West, and Center-East regions decreased their burglary victimization risk significantly between 2018 and 2022, whereas this was not the case for dwellers in the South, East, and Peninsula regions nor for those without restricted access mechanisms (see Fig. 6 and Fig. 7). These patterns suggest that the effectiveness of target accessibility factors depends on the regional context above and beyond the compositional characteristics of their populations and the moderating effects of time on the previous theoretical relationships.

Some results concerning the control variables are also of interest. Conflict among neighbors is the strongest correlate of residential burglary confirming what other studies have already suggested regarding the importance of social informal controls and social guardianship (D. M. Reynald, 2018; Vilalta & Fondevila, 2023). However, we did not anticipate such strong effects on burglary victimization. Living alone was included as a proxy measure of vulnerability against burglary level of guardianship and we confirmed it significantly increased burglary risk. One of our proxy measures of target suitability, in terms of value and expected rewards, did not conform to expectations. We expected higher probabilities of burglary in households with more schooling, however, we found that dwellers with basic formal education (i.e., nine years in Mexico) had similar probabilities of burglary as those without any formal education (as the group of reference), while those with university education had significantly lower probabilities of burglary as compared to the reference group. Occupation, on the other hand, seems to have conformed with expectations: Employers and Self-employed reported a higher burglary risk, theoretically due to having better incomes and better housing conditions than others. Female respondents were slightly more likely than male respondents to report burglary victimization, but evidence including that from previous studies, does not allow us to know whether males are less likely to be burglarized per se or less likely to report actual or attempted burglaries.

In summary, after controlling for a variety of CPTED, RAT, and RCP, RAT correlates of residential burglary, we found evidence that the burglary victimization decreasing trend observed between 2018 and 2022, was associated with apartment dwellers and dwellers with restricted access mechanisms in some regions. Detached house dwellers and those without restricted access mechanisms did not see their burglary risk decrease over time in any region. These differences serve as evidence of contextual effects operating in the relationships that the above theories have advanced but have not been tested thoroughly for an entire system of cities over time. What these contextual effects mean also, is that there is not just one story to tell about urban Mexico's decreasing trend, but that there are several regional stories to tell. In the next section, we turn to discuss these stories.

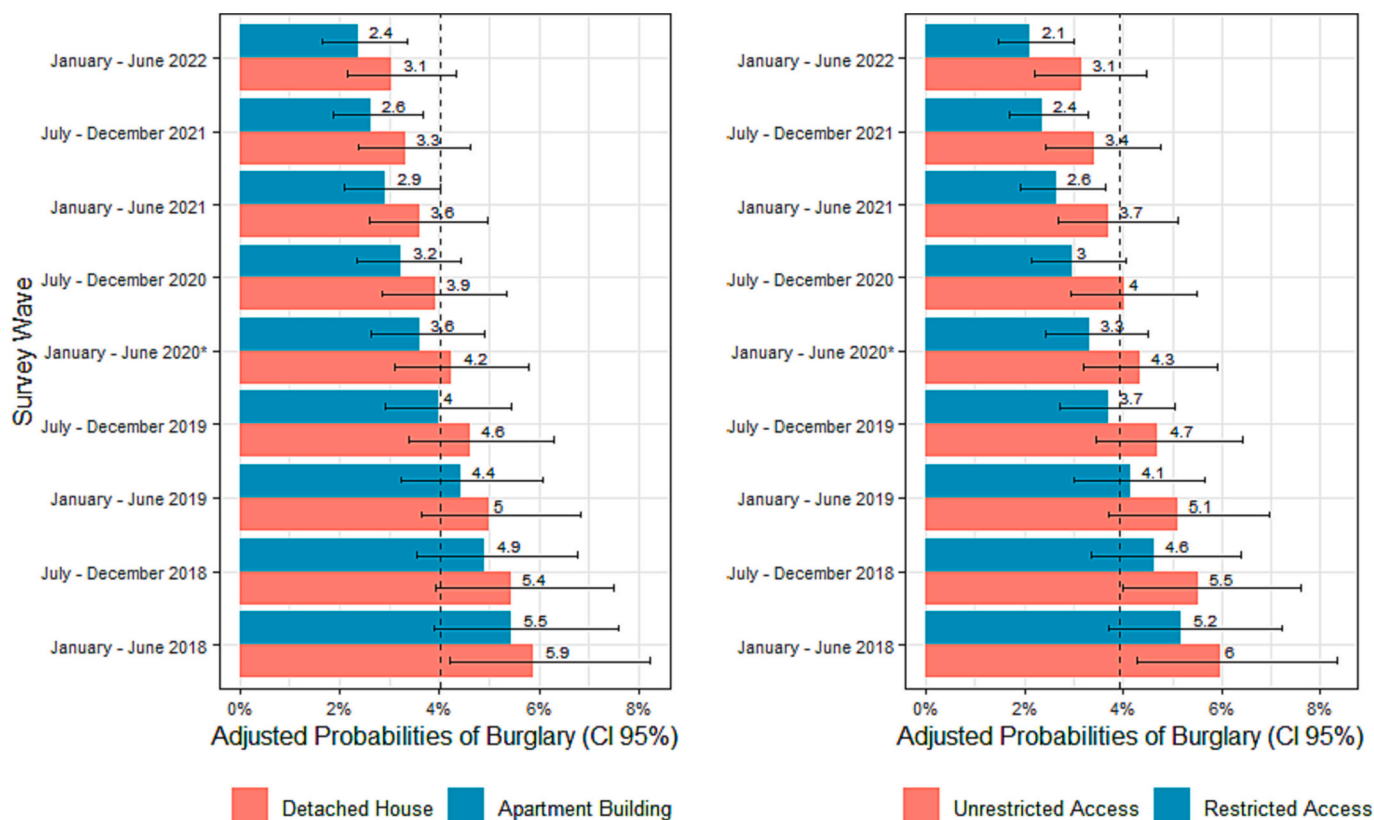


Fig. 5. Model 4: adjusted probabilities of burglary victimization in interaction between type of dwelling and restricted access respectively with time. Note: The dotted horizontal line represents the average adjusted probabilities of burglary.

6. Discussion and conclusion

Residential burglary rates exhibited a significant decline from January 2018 to June 2022 in the Mexican system of cities. Our findings indicate that this downward trend varied among different types of dwellings and their access mechanisms in different regions. Specifically, apartment dwellers and those with restricted access mechanisms residing in the Northwest, North, Northeast, Center-West, and Center-East cities experienced a significant decrease in burglary victimization during the stated period. On the contrary, residents living in cities within the South, East, and Peninsula regions did not observe a significant reduction in their burglary risk regardless of their dwelling type or use of restricted access mechanisms.

When considering these regional contextual effects on burglary risk, there are several possible explanations. One potential explanation is related to methodological issues, such as model endogeneity. It could be argued that burglary victimization is not strictly exogenous due to individuals possibly making choices such as moving from a detached house to an apartment or implementing restricted access measures after victimization. This could lead them to respond positively to the survey question about burglary victimization even if they were not actually victims during the time of the survey. This possibility cannot be ruled out. Another likely explanation for regional effects is measurement error in assessing dwelling types and restricted access measures in surveys like ENSU. These measures may be too broad and imperfect for accurately capturing target accessibility and suitability when studying regional variations in burglary rates.

Consideration of contextual effects in our modeling allow for the incorporation of unobserved heterogeneity, such as household compositional characteristics and city-level variations within regions. The significant variation captured by the random intercepts and slopes indicates that our models account for a wide range of unmeasured factors

that contribute to regional differences. These differences could be attributed to factors like specific dwelling designs (e.g., detached houses without garages or low-rise apartments) prevalent in certain regions or preferences for restricted access mechanisms (e.g., security booths with doorman) unique to each region.

One contextual risk factor to consider when examining burglary risk in Mexico is the impact of local police effectiveness and the rule of law. Previous studies based on CPTED and RCP perspectives have largely overlooked this risk factor. For RAT, police effectiveness can be seen as a form of formal guardianship. Similarly, in collective efficacy theory, which we did not discuss in this study, police effectiveness would pertain to formal social control.

The ENSU does not currently include measures of formal guardianship. It is worth noting that conflicts with neighbors, as a measure of informal social control, were found to be associated with increased burglary risk. Additionally, it is possible that aspects related to police effectiveness in addressing crime impunity and enforcing formal social control may have significant implications for burglary studies conducted in Mexico and other countries characterized by high levels of crime. Future investigations could explore these risk factors further.

In terms of the temporal context, there are clearly distinguishable periods: 2018 and the period between 2019 and 2022. It is intriguing to observe that the consistent decline in burglary victimization came to a halt in December 2020, coinciding with the onset of the COVID-19 pandemic's most severe impacts. Since then, burglary rates nationwide have maintained stable within the margin of error. There are two possible explanations for this phenomenon. Firstly, it is possible that there may be limited potential for further decreases in urban burglary, despite the fact that urban areas in Mexico still have twice the rates of those in the United States (Farrell, 2022). Secondly, it is plausible that while burglaries have decreased, other crimes have simultaneously increased. The ENSU survey reveals a decline not only in burglaries but

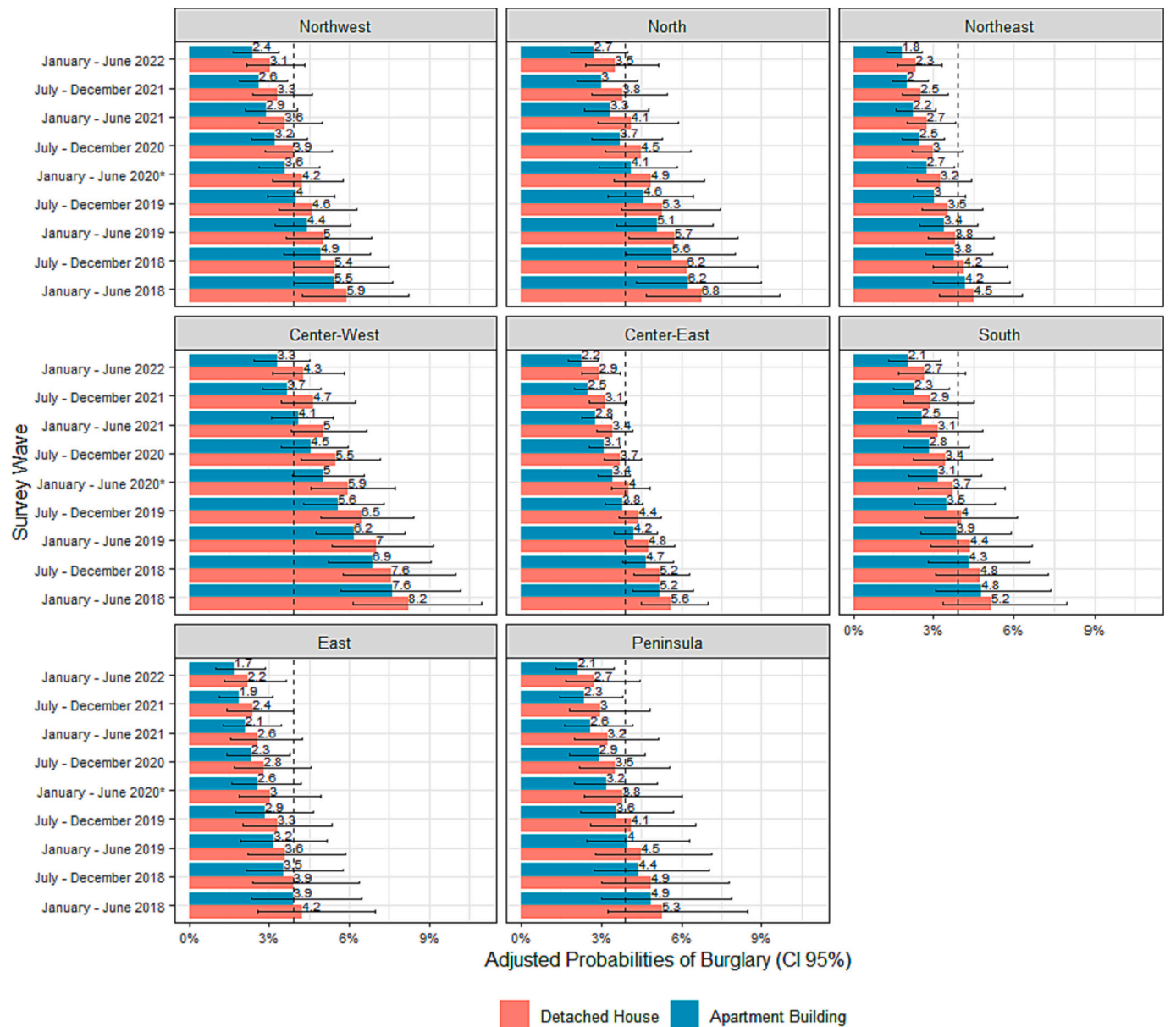


Fig. 6. Model 4: adjusted probabilities of burglary victimization in the interaction between type of dwelling and time by region. Note: The dotted horizontal line represents the average adjusted probabilities of burglary.

also in vehicle thefts, auto part thefts, and street and public transportation robberies. However, incidents of theft or extortion show no signs of decreasing. In addition, according to the ENVIPE survey results indicate an upswing specifically with regards to extortions and credit card fraud cases—suggestive of a shift towards less direct forms of predation.

In summary, our objective was to make a significant contribution to the global body of research by examining whether there is evidence supporting the contextual effects proposed by CPTED, RAT, and RCP perspectives across multiple cities over an extended period of time. We have shown evidence of such contextual effects for the case of the relationship between different measures of target accessibility and burglary risk. Our findings suggest that the effectiveness of similar dwelling designs and restricted access mechanisms in reducing burglary risk may vary depending on the regional context. These findings carry significant implications for crime prevention strategies, as they emphasize the importance of taking into account contextual factors

when conceiving interventions to reduce burglary risk. We must investigate how specific designs in different regions influence crime opportunities over time.

CRedit authorship contribution statement

Carlos Vilalta: Conceptualization, Methodology, Software, Data curation, Writing, and Investigation.
Gustavo Fondevila: Validation and Editing.

Declaration of competing interest

None.

Data availability

Survey data is official and publicly available

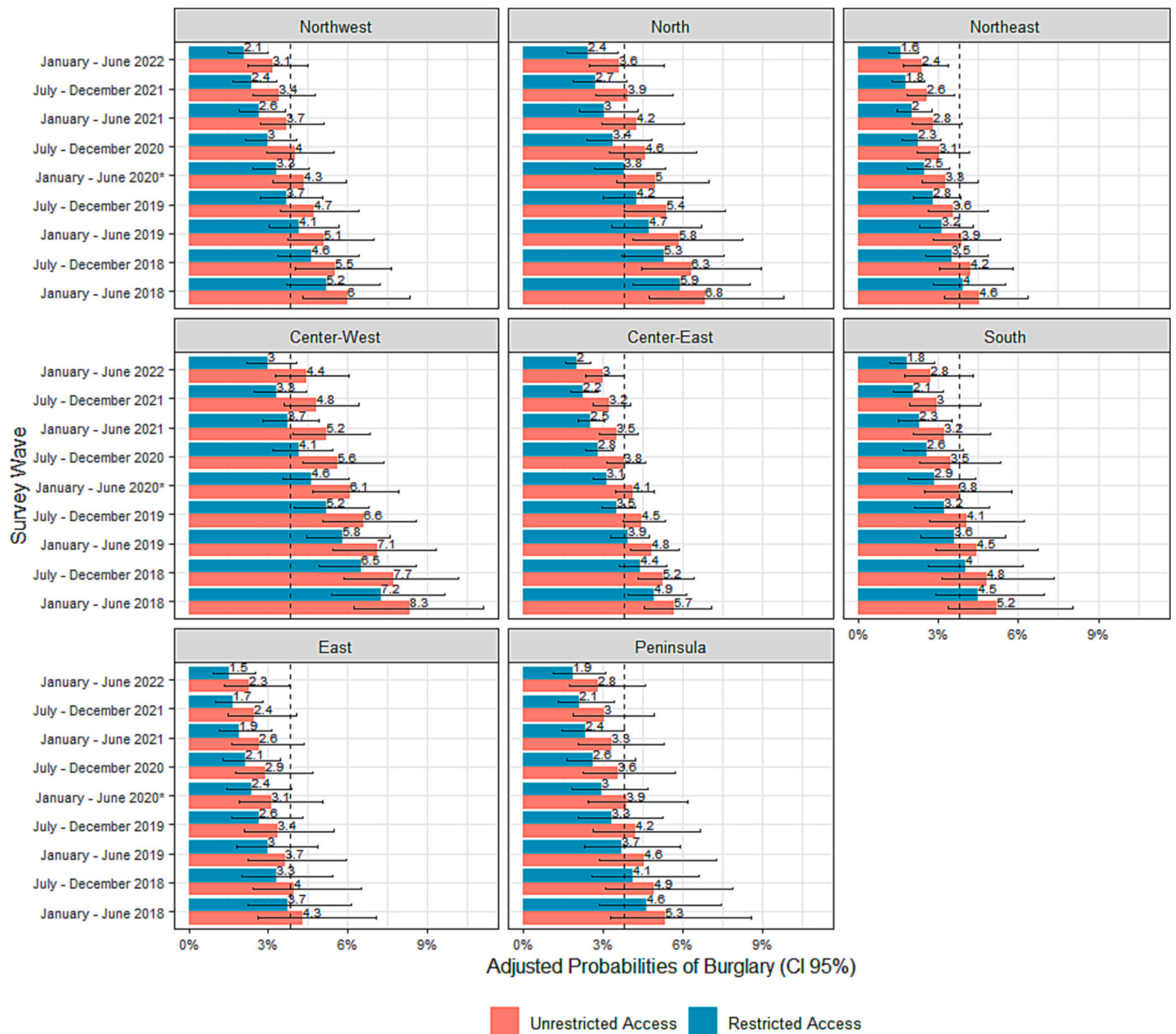


Fig. 7. Model 4: adjusted probabilities of burglary victimization in the interaction between restricted access and time by region.
Note: The dotted horizontal line represents the average adjusted probabilities of burglary.

Appendix A

Table A1

Urban Mexico: adult population and percent reports of burglary, apartment dwellers, and restricted access mechanisms by survey wave (June 2018 to June 2022).

	Sample size	Population	Burglarized	Apartment dwellers	A barrier to the main entrance
June 2018	59,897	36,869,197	7.7 %	11.9 %	17.5 %
December 2018	60,752	38,462,234	6.6 %	11.9 %	14.0 %
June 2019	64,327	39,857,067	6.4 %	11.2 %	14.4 %
December 2019	73,681	40,647,770	6.0 %	11.5 %	18.1 %
September 2020	72,474	41,244,912	5.3 %	10.8 %	14.6 %
December 2020	72,663	41,361,004	4.4 %	10.8 %	13.0 %
June 2021	72,489	41,815,472	4.9 %	10.8 %	14.0 %
December 2021	75,572	43,767,994	4.3 %	10.3 %	14.3 %
June 2022	76,061	43,930,175	4.3 %	9.7 %	13.3 %
Total/general	627,916	367,955,825	5.5 %	11.0 %	14.8 %

Note: Estimates based on each ENSU wave expansion factors.

Table A2

Complementary log-log mixed effects regression results (OR: odd ratios).

	Model 1: unconditional means		Model 2: unconditional growth		Model 3: conditional means		Model 4: conditional growth	
	OR	SE	OR	SE	OR	SE	OR	SE
Fixed effects:								
Apartment × time							0.978**	0.000
Restricted access × time							0.968**	0.000
Apartment					0.861**	0.001*	0.942**	0.002
Restricted access					0.785**	0.001	0.891**	0.001
Time		0.922**	0.018				0.924**	0.018
Region: north					1.046	0.113	1.158	0.280
Region: northeast					0.840	0.086	0.758	0.174
Region: center-west					1.116	0.106	1.411	0.301
Region: center-east					0.770	0.064	0.950	0.178
Region: south					0.784	0.095	0.868	0.237
Region: east					0.970	0.125	0.710	0.214
Region: peninsula					1.059	0.137	0.890	0.260
Live alone					1.073**	0.001	1.081**	0.001
Schooling: basic					0.995	0.002	1.000	0.002
Schooling: high-school					1.050**	0.002	1.066**	0.002
Schooling: university					0.939**	0.002	0.958**	0.002
Occupation: temporal worker					1.167**	0.003	1.173**	0.003
Occupation: employee					1.167**	0.001	1.162**	0.001
Occupation: self-employed					1.397**	0.001	1.399**	0.001
Occupation: employer					1.456**	0.002	1.483**	0.002
Conflict w/ neighbors					1.988**	0.001	1.973**	0.001
Female					1.033**	0.000	1.035**	0.000
Intercept	0.054**	0.002	0.076**	0.008	0.042**	0.003	0.055**	0.100
Random effects:								
SD intercepts (regions: urb. areas)	0.299		1.063		0.240		1.005	
SD slopes (time)			0.185				0.185	
Corr. (intercepts/slopes)			−0.834				−0.845	
Conditional R2	0.052		0.273		0.086		0.295	
Marginal R2	0.000		0.019		0.055		0.071	
ICC	0.052		0.259		0.034		0.240	
Performance accuracy	57.5 %		59.7 %		69.4 %		70.7 %	
Regions	8		8		8		8	
Urban areas	94		94		94		94	
Obs.	627,916		627,916		448,431		448,431	

* p < 0.05.

** p < 0.01.

Table A3

Model 4: descriptive statistics of estimation sample.

	Mean	Std. dev.	Min.	Max.
Burglary	0.02	0.15	0	1
Apartment	0.10	0.29	0	1
Restricted access	0.12	0.32	0	1
Time	5.32	2.49	1	9
Region: northwest	Reference			
Region: north	0.11	0.31	0	1
Region: northeast	0.13	0.33	0	1
Region: center-west	0.17	0.38	0	1
Region: center-east	0.31	0.46	0	1
Region: south	0.07	0.26	0	1
Region: east	0.04	0.19	0	1
Region: peninsula	0.05	0.22	0	1
Live alone	0.06	0.24	0	1
Schooling: no schooling	Reference			
Schooling: basic	0.40	0.49	0	1
Schooling: high-school	0.27	0.45	0	1
Schooling: university	0.29	0.46	0	1
Occupation: not a worker	Reference			
Occupation: temporal worker	0.01	0.10	0	1
Occupation: employee	0.47	0.50	0	1
Occupation: self-employed	0.16	0.37	0	1
Occupation: employer	0.02	0.13	0	1
Conflict w/ neighbors	0.11	0.31	0	1
Female	0.53	0.50	0	1

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