

Conferencia Interamericana de Seguridad Social



**Centro Interamericano de
Estudios de Seguridad Social**

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PUBLIC SPACES IN MEXICO AS SOCIAL COHESION PROMOTERS: AN STRUCTURAL MODELING PERSPECTIVE

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Note: The current article includes a thorough revision of the literature, empirical analysis of 8242 participants using structural equation models and public policy implications. A preliminary version, limited to the conceptual and methodological aspects of this research, has been previously published in *Estudios Sociológicos*. Vol. 30, No. 90 (septiembre-diciembre, 2012), pp. 897-914.

Abstract

This research assessed the effects of several contextual factors (e.g. neighborhood insecurity, evaluation of public spaces, infrastructure, low risk behaviors) on social cohesion and residential satisfaction, in the context of low and medium-low socio economic status of individuals nearby renovated public spaces (parks and recreational facilities) in Mexico. The research method is based on structural equation models to study the concurrent interrelations of factors influencing social cohesion and residential satisfaction. The findings of the study suggest the importance of public spaces in promoting informal social ties that enhance social cohesion. The effect of social cohesion is able to counteract perceived insecurity and fear of crime.

— Keywords: public spaces, social cohesion, social capital, perceived insecurity, structural equations

Introduction

Latin America is marked by sharp differences in levels of well-being among areas within each country, and among different segments of the population. Many of these inequalities are of long-standing, but in some cases inequality processes are exacerbating them. In any case, Latin America's development potential is being stopped by these pervasive mechanisms, which limit the development of both individuals and society by fuelling increasingly inter personal and community conflicts. It is clear that progress needs to be made towards strengthening of social networks and social cohesion. The conflicts are present in societies but it is important to create mechanisms to deal with them that facilitate the social interaction. A cohesive society has a greater capacity to solve conflicts since social cohesion open de road to other normative, cultural and social resources (Berger-Schmitt, 2000).

Both academic investigation and the outcome of public policy in numerous countries have emphasized the fundamental role that quality public spaces play in the strengthening of social cohesion in a community of any size. Particularly of note is the capacity for public spaces to generate feelings of security and a sense of community and trust among inhabitants of the area of influence, as well as adherence to a set of rules and values so that groups with different cultural and social backgrounds can coexist harmoniously (Mulgan et al., 2006).

Public policies aimed at creating greater social inclusion or equality of opportunity require a social contract to give them force and continuity. The citizenry's greater willingness to support democracy, play a role in public affairs and deliberations, and place trust in society's institutions, as well as the people's greater sense of belonging to the community and solidarity with excluded and vulnerable groups, pave the way for the social covenants or contracts needed to underpin policies for achieving equity and inclusion (ECLAC, 2006).

Social cohesion is related with mechanisms that provide integration and well-being, on the one hand, and a full individual sense of belonging to society, on the other. Social cohesion may thus be understood in terms of both the effectiveness of instituted social inclusion mechanisms and the behaviors and value judgments of the members of society. Inclusion mechanisms include employment, educational systems, rights and policies designed to encourage equity, well-being and social protection. Behaviors and value judgments include issues as diverse as trust in institutions, social capital, developing a sense of belonging to a community and solidarity, acceptance of social rules and the willingness to participate in deliberative processes and collective endeavors.

Growth and increased access to information and communications have also created expectations of greater well-being, but these expectations clash with the concentration of wealth that increase inequality present in Latin America. From a neoliberal approach cultural changes encourage greater individualism, it is unclear from this perspective how individuals can recreate social ties. The primacy of the private sphere over the public sphere, and of personal autonomy over collective solidarity, is a product of both the economy and the media culture, as well as the heightened role of consumption in social life. Several authors have noted that these phenomena coincide with the decline of utopias, collective endeavors and the sense of belonging to a community. These trends have led to a search for ways to recreate social ties, from small family circles to society at large. From that perspective, working to achieve social cohesion means working to recreate social ties, to reconstruct the social tissue, to trust the institutions, aspects that need special attention to our society as a whole.

The same phenomenon can occur as a result of other types of social segmentation, such as that based on place of residence. It would be interesting to consider physical space not just as an expression of social inequalities and discrimination, but also as something that helps to form the "habitus" conditioning people's closeness to and distance from one another on the subjective plane, in the sphere of beliefs, thoughts, dispositions and perceptions (Bourdieu, 2000).

The research question in this study is to investigate the effect of perceived insecurity, neighborhood infrastructure, the condition of public spaces and risk behavior on social cohesion and residential satisfaction in urban environments of medium and low socioeconomic levels in Mexico. These effects are studied empirically using data from the National Survey of Public Spaces 2010 and through structural equation models (Bollen,

1989); the effectiveness of this methodology for analyzing complex social phenomena has been previously demonstrated in literature (Barrón and Sánchez, 2001).

The following sections are organized as follows: first we explain the conceptual framework that supports the theoretical model that includes the measurement of the subjective constructs proposed (e.g. perceived insecurity, neighborhood infrastructure, social cohesion and residential satisfaction, among others). The next section fits a structural equations model using survey data to explain the complex relationships among the subjective constructs previously mentioned. Finally we present the main findings and conclusions in the last sections.

1. Social cohesion, social capital and public spaces

The concepts of social capital and social cohesion have been on debate in the literature for a while and there is no consensus in the definition among researchers. For example, Durkheim speaks that a cohesive society provides a mutual support of a collectivity (a group of people) that share a collective synergy, rather than considering single individuals interacting (Durkheim, 1997:210). Low levels of social cohesion are associated with (1) high levels of conflicts, inequality, social support, and polarization; (2) further, there are strong bonds that can be measured through high levels of reciprocity and social capital (Kawachi & Berkman, 2000:175). Social capital can be seen more in the sense of the actual “amount” of resources that can be used to interchange with other individuals or group to enhance the sense of community or the social network itself, from this perspective social cohesion is associated to a community level and social capital is addressed to individuals. Social cohesion is a broader concept that incorporates contextual aspects and social capital is a more concrete concept that focuses on individuals and their interaction with others.

Pierre Bourdieu’s defines “Social capital (as) the sum of resources, actual or virtual, that accrue to an individual or group by virtue of possessing a durable network or more or less institutionalized relationships of mutual acquaintance and recognition” (1986:119). Social capital has been defined by “...its function. It is not a single entity, but a variety of different entities having two characteristics in common: they all consist of some aspect of social structure, and they facilitate certain actions of individuals who are within the structure. Social capital is productive (like other forms of capital), making possible the achievement of certain ends that would not be attainable in its absence” (Coleman, 1990:302).

For the purposes of this article we use the definition of social cohesion as discussed earlier to understand how the social process explains its consolidation in the contexts of public spaces embedded into neighborhoods. A public space is the natural place where social interactions among individuals can occur in a given neighborhood.

Evidence exists that the physical environment influences human behavior, and a public space is one possibility where this interaction might occur; even more, there are theoretical models that propose a deterministic relationship of the environment on many kinds of human phenomenon (Blaut, 1999). Even when this position is considered to be too extreme, there is agreement about the function of architects and urban designers as those who identify the ideal design of a space for human use. For example, people feel comfortable and safe in

a public space that makes them feel secure to assure its continued use (Llewelyn-Davies, 2000). There is a consensus that public spaces correctly designed and adequately maintained promote social inclusion and civic-mindedness, as well as contribute to social cohesion and residential satisfaction, while low-quality public spaces (from physical deterioration) incite antisocial behaviors (Lyndhurst, 2004).

Nonetheless, it would be naïve (and deterministic) to assume that the construction of attractive public spaces automatically translates to an improvement in social activity and an increase in use,¹ but rather there are other important factors that must be taken into account to obtain a favorable interaction. The factors that influence social cohesion include social participation, appropriation of space, community support, the perceived level of insecurity, social actions in public spaces, among others (Programa de Rescate de Espacios Públicos, SEDESOL, 2008:24). For this reason, it is possible that urban design increases the potential adoption for certain desirable social behaviors (like social inclusion, civic-mindedness and social cohesion) and reduces anti-social behaviors, which include criminality and violence (Ferguson & Mindel, 2007:325).

A number of authors have empirically shown that residential stability (associated with the time of residence in a given neighborhood) is positively associated with a sense of belonging to a neighborhood (Brown, Perkins & Brown, 2003). One of the mechanisms that explains this effect is related to contact with other neighbors by means of reciprocal information exchange (like advice on child-rearing, employment opportunities) and favors as a consequence of increased levels of trust, that is a critical characteristic of social cohesion (Coleman, 1990).

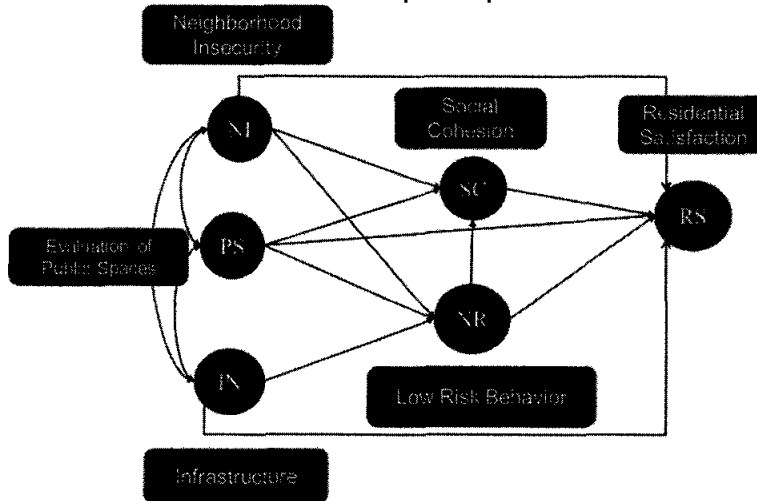
The mechanisms related to social cohesion construction is not easy to understand and requires of complex modeling. For this reason, we first explain the constructs that are included in the conceptual model and how to operationalize them in the following section.

2. Conceptual model for public spaces

To analyze the effect of public spaces on social cohesion we use an empirical approach based on a theoretical model. In this regard we need first to operationalize the variables involved to measure the subjective concepts, and then provide empirical evidence that the model fits using survey data. The theoretical model is used to explain the relationships among predictors of social cohesion and residential satisfaction, as presented in Figure 1.

¹ Actually the authors conducting a qualitative study on the field found evidence of one recreational park recently build with brand new amenities (swimming pool, soccer, basketball, softball fields, and gambling area for youngsters) that was abandoned. The population nearby refused to visit the place because they don't feel the park belongs to them.

Figure 1.
**Conceptual model of social cohesion and residential satisfaction for neighborhoods
in the context of public spaces.**



The model in figure 1 presents a conceptual model that explains social cohesion and residential satisfaction, which includes as antecedents perceptions of physical and tangible aspects that are generated by external conditions (insecurity, neighborhood infrastructure and evaluation of the physical attributed of public spaces). The study will analyze the influence of these external and physical factors (exogenous variables) on the social cohesion and residential satisfaction (endogenous variables).²

In this model we foresee the relationships of neighborhood insecurity, evaluation of public spaces, neighborhood infrastructure, social cohesion, low risk behaviors, and residential satisfaction that will be explained carefully in the following sections. These concepts are interrelated and the model seeks for an explanation on how social cohesion can be described in terms of contextual factors and finally how it is linked to residential satisfaction. In the next sections we will explain the concepts, and the proxy scales to fit the model.

The public spaces in this investigation are defined as the place in the neighborhood where families, children, youth, and elder population socialize. The activities held in the public space depend on the size and the status of intervention.³ Two types spaces are studied: family (for children, youth and elder population) and sportive.

In the following sections we explain each one of the factors that influence social cohesion on residential satisfaction as depicted in the theoretical model (as shown in Figure 1).

²The endogenous variables in a regression model are also known as dependent variables; analogously the exogenous variables are the independent variables.

³The intervention is the time when a specific public space is renovated or build. Some public spaces in this research are three years old and others are in earlier stages of design and construction.

2.1 Perception of insecurity

In Social Psychology literature, the construct of perceived insecurity is related to three fundamental dimensions: fear of being a victim of crime, the characterization of a place and dangerous, and the processes of risk perception. In the first case, the fear of being a victim of a crime is generally related to four fundamental elements (Miceli, Roccato, & Rosato, 2004:778): (1) The objective level of crime, with the understanding that not all crimes equally influence the perception of insecurity; (2) evidence of physical neglect and anti-social behavior as these can be interpreted as indications of social degradation; (3) characteristics of urban life, for example, the size of buildings, levels of perceived aggressiveness and level of vegetation, among others; (4) psychological and demographic variables, such as perceived self-efficacy of personal ability in controlling a dangerous situation.

In second place, the characterization of a place as high risk is related to activities potentially criminal or marginalized. This perception depends on physical aspects (lighting, perceived vandalism, gang presence) and social ones (available help, presence of threats). Another dimension refers to the social processes of information diffusion and the opinion of how many criminal activities are detected in the zone. Finally, the representation of the place includes variables pertaining to the identification of the community or neighborhood, social influence, etc. In a study by Carro, Valera & Vidal (2010:309), precisely this factor is seen to exercise great influence on the perception of insecurity.

With regard to the influence of the physical environment on the perception of insecurity, there is a tendency, both conceptual and practical, to emphasize the role that urban and architectural design has in criminal opportunity. This tendency, called Crime Prevention Through Environmental Design (CPTED), is becoming more and more popular in various countries of Latin America, specifically Chile and Brazil. The principal ideologist of this trend C. Ray Jeffery, assert that “the proper design and effective use of the built environment can lead to a reduction in the fear and incidence of crime, and an improvement in the quality of life”(Jeffery, 1977:87). It is a crime prevention philosophy based on proper design and effective use of the built environment leading to a reduction in the incidence and fear of crime, as well as an improvement in quality of life. CPTED reduces criminal opportunity and fosters positive social interaction among legitimate users of space. The emphasis is on prevention rather than apprehension and punishment. It is an advanced approach and is being implemented on a global scale (Cozens, Saville, & Hillier, 2005).

Authors like Wilson (1975) point out that neglect and lack of civic-mindedness in the environments in which people reside or travel contribute to an increasing sense of insecurity and perception on risk. It has been proven recently that these signs of deterioration influence perceptions of fear, risk and satisfaction with the community, both at an individual, resident level residents, as well as that of the neighborhood (Robinson, Lawton, Taylor & Perkins, 2003: 271).

For this reason, we hypothesize that high levels of insecurity are associated with perceptions of deficiencies in the quality of public spaces (neglect or abandon) that affect negatively de formation of social cohesion.

2.2 Neighborhood infrastructure

Kamphuis, Mackenbach, Giskes, Huisman, Brug & van Lenthe (2010) investigate the causes behind why people of a low socioeconomic level perceive their environment much more negatively than those of a high level. The analysis concludes that these differences can be explained for the most part by the physical characteristics of the neighborhood (aspects such as urban design, aesthetic aspects, heavy traffic, and perception of security); low social cohesion and adverse psychosocial circumstances exercise limited influence. Likewise, Hur and Morrow-Jones (2008) suggest that the aesthetic appearance of the neighborhood, which is normally positively related to physical indicators of urban design quality, is the most important factor of residential satisfaction. This same finding is reported by Lovejoy, Handy & Mokhtarian (2010).

For this reason, (H_i) it is likely that neighborhoods with high levels of insecurity are related with low scores in neighborhood infrastructure.

2.3 Evaluation of public spaces

Studies previously related to satisfaction with public spaces (as is the case with parks, sports and cultural facilities) are rare and have been done in other national contexts, as is the case with the English park done by Eng and Niininen (2005). There are at least two differentiating elements in traditional satisfaction studies: (1) the absence of the human element, such as a service provider, which is a central part of service evaluation in the majority of private sector investigations; (2) intangible elements related to emotional experiences that are out of the control of public authorities.

Some of the criteria frequently considered in the evaluation of public area quality are the following (Carmona and Magalhaes, 2007:10): cleanliness, accessibility, aesthetic, comfort, functionality, safety, durability and resistance, personality, and sense of permanence. There is a growing tendency to emphasize the importance of strengthening a sense of community and thus public policy dealing with public spaces in countries like the United Kingdom are moving away from an emphasis on tangible aspects such as clean and green spaces toward a holistic approach of community strengthening.

These elements have been identified by Carmona and Magalhaes (2007) in a study done in the United Kingdom. The results are plausible in general terms, as public spaces with evident signs of lack of maintenance are evaluated very negatively by residents. We hypothesize the lack of maintenance of public spaces makes them less attractive to residents and are assessed negatively. Therefore we expect a positive association between evaluation of public spaces and neighborhood infrastructure.

2.4 Risk behaviors in the neighborhood⁴

This construct reflects the level of respect to laws and social norms in the neighborhood community, which translates into a level of peace and security perceived by the residents. In reality, it is a phenomenon of two opposites: order and disorder. For this reason, measurement can be done from a negative or positive point of view. Residents of the neighborhood or visitors normally use a series of tangible indicators or visible clues to evaluate a level of organization; these clues can be both physical and social. Thus, the social organization is interpreted by means of visible signals that evidence a lack of control by people, such as fighting and problems between neighbors, the presence of drug users and gangs, which all contribute to a sense of lacking in adherence to social norms and social disorder. This construct can therefore be designated high risk behaviors. With regard to physical disorganization, this refers to the physical appearance of a neighborhood or community, including signs such as dirtiness, neglect, excessive noise, deteriorated constructions or buildings, and signs of vandalism and graffiti. In fact, graffiti and vandalism indicate a loss of social control.

High risk behavior in a neighborhood translates into very relevant consequences for neighbors on an individual level (for aspects such as loss of wellbeing, isolation, anxiety and loss of confidence) as well as at a community level (reduction in social bonds), which can cause greater levels of neighborhood disorganization.

These facts lead us to postulate the hypothesis (H₂) that a deficient infrastructure in a neighborhood is related to high risk behavior in the neighborhood and that positive evaluations of physical aspects of public spaces are related to a low risk behavior in the neighborhood.

2.5 Social cohesion⁵

Some definitions of social cohesion refer specifically to public spaces, as proposed by Nash and Christie: cohesion means that all social groups feel free to enjoy the public spaces, free from attack, abuse and hostile acts (2003:39). Nonetheless, the majority of authors concur in pointing out that social cohesion represents integration of individual behaviors in a social environment and has many dimensions. The study that is probably the one most cited is that of Buckner (1988), who conceptualized social cohesion as a phenomenon at group level that consists of three dimensions: (1) Sense of Community, defined as a feeling of belonging to a certain group; (2) Attraction, understood as the capacity for a neighborhood or community to persuade its inhabitants to continue residing in this area; and (3) Social Connection, which is the development and frequency of social ties among neighbors.

⁴Perceptions of insecurity and high risk behaviors are different constructs. Perceptions of insecurity measures fear to an unsafe environment when the high criminality and violence is perceived by individuals, these perceptions comes from the media; meanwhile high risk behaviors is a construct that tabs aspects of neighborhood disorganization.

⁵The concepts of social capital and social cohesion are not clearly identified. It is relevant to define these concepts. However, what is more relevant is that at the end strengthening the social ties, social networks, norms of reciprocity, sense of belonging, among others has positive effects on society since regenerate the social tissue, fosters a more stable society and the strengthens concept of a nation that is potentially lost. Public spaces are potentially one place where social capital and social cohesion plays an important role in promoting collective behaviors for improving social ties, and social bonds. In this investigation we use the concept of social cohesion as part of the conceptual model. Therefore we need to define first all factors explaining social cohesion and residential satisfaction as part of the conceptual model proposed for this investigation.

Authors like Dempsey (2009) relate social cohesion to the following dimensions: social interaction, social networks, sense of community, participation in organized activities, trust and reciprocity, perceived security and sense of belonging.

Another critical aspect is the direction of influence between social cohesion and public space. Though some authors affirm that correct urban design promotes a sense of community (Talen, 1999), others conclude that additional factors exist that are not related to physical space and whose influence in social cohesion is fundamental. These factors are aspects that cannot be controlled, such as the friendliness of neighbors, vehicle traffic and others that can be controlled by public policy, such as political presence, community activities, among others.

In the case of high risk behavior in the neighborhood, a lack of house and street maintenance, uncivil behavior such as graffiti, garbage on the street or intoxicated people, constitute symbolic insults and are indicators of a lack of control in development of the neighborhood and that the social fabric is in the process of disintegrating (McGuire, 1997).

For this reason, the following hypothesis (H_3) is proposed: As perception of low risk behavior in neighborhood increases, it has a positive effect on social cohesion.

A clear indicator of deterioration in an urban zone is the growth in insecurity and criminal indicators. As a consequence of this increase in the perception of insecurity, the levels of a sense of community and attraction to the neighborhood are significantly reduced (Sampson y Raudenbush, 2004;331). Insecurity causes residents to not participate in community activities and to keep away from public spaces, thus reducing the physical limits of the places of which they feel they are members, many times reducing them to their own home. In this way, their relationships with their neighbors are restricted, so that the level of social cohesion is negatively affected.

Based on this, the following hypothesis (H_4) is put forward: the perception of insecurity has a negative effect on the social cohesion around public spaces and therefore is a factor which inhibits social interaction.⁶

Considering that one of the three dimensions of social cohesion is attraction, understood as the ability of a neighborhood or community to persuade its inhabitants to continue residing in this area, one can then assume that projects and social action in public spaces that exceed inhabitants' expectations would tend to improve social cohesion.

Therefore, the following hypothesis (H_5) is formulated: satisfaction with projects that promote social participation in public spaces has a positive impact on social cohesion.

2.6 Residential satisfaction

Residential satisfaction is defined as the general opinion of residents of their neighborhood environment. Lovejoy et al. (2010) carried out an exhaustive revision of literature that analyzes

⁶Social interaction is not a construct, we use this term as one of the construct of social cohesion. The greater the scores of perceptions of insecurity the lower the scores of social cohesion; therefore individuals do not interact to each other in the community and inhibits social interaction.

the factors which explain residential satisfaction. The analyzed characteristics were: attractive (measured by characteristics such as physical appearance, level of upkeep and style of houses), safety (to walk, for children, low crime rates), tranquility, social interaction of neighbors, size of house yards, availability of commercial zones and community centers, infrastructure (street lighting, sidewalks in good condition, availability of parking). Of all of these, those that most determine satisfaction are the first two: attractive and neighborhood safety.

Based on the conclusions of the previous investigation, the following hypothesis is proposed (H_6): greater levels of low risk behaviors in the neighborhood are related to a higher residential satisfaction. In addition, greater levels of perception of insecurity are related to a lower residential satisfaction.

With regard to the possible effect of social cohesion on residential satisfaction, it is important to consider that social cohesion acts as a motor which impulses participation in programs that are carried out in public spaces. This has been documented in investigations, such as the one published by Cradock et al. (2009), in which it is shown that social cohesion in a neighborhood is a significant determinant for promoting participation among youth in sports programs that take place in public spaces. Other authors have found identical social cohesion effects in promoting participation in health programs among neighborhood residents (Kawachi and Berkman, 2000:184-186).

Given that insecurity and social cohesion in a community have competing influences, it is important to evaluate the relative magnitude of both. To this effect, social cohesion reduces a person's perception of vulnerability as it is understood that any neighbor could come to the aid of this person if he were in danger. Other authors determine that the most profound processes of social interaction carried out by a neighborhood organization for the coordination of actions in benefit of the neighborhood motivate feeling of affection for the neighborhood that surpass any perception of insecurity (Comstock *et al.*, 2010).

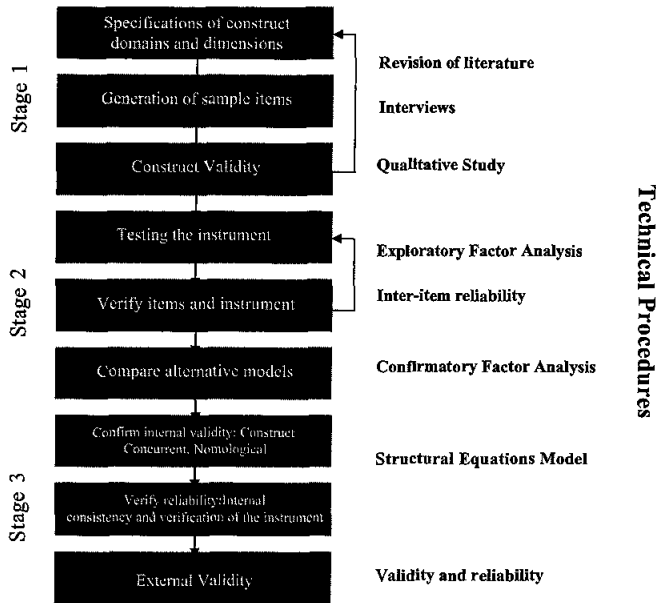
The following hypothesis (H_7) foresees that the effect of social cohesion on residential satisfaction will be of greater magnitude than that of perceived insecurity.

The concepts presented in the analytic model (Figure 1) and explained in the former section are operationalized into constructs or proxies by mean of multiple indicators. The multiple indicators model conform a measurement error model that are intended to tap each construct. The measurement models are interrelated through a structural equation model. This model is explained in the next section.

3. Methodology

The design of the investigation involves the carrying out of three consecutive stages with two complementary methodologies, which are illustrated in Figure 2. Namely, the study begins with Stage 1, with the theoretical conceptualization of the analytic model (see Figure 1).

Figure 2.
Qualitative and Quantitative Methodology for the Study of Perceptions of Insecurity, Satisfaction and Social Cohesion



In this stage, an extensive review of literature in the areas of Sociology, Social Psychology and Advanced Statistics is carried out; in this phase the hypotheses based on the proposed model are generated. Similarly, by means of a qualitative study, the domains are specified that define and influence the constructs of the study objective. In this same phase, questions (items) are identified from the questionnaire and the wording of each one of the items is evaluated that operationalize the concepts previously outlined in the analytic model. In this stage, a qualitative investigation is proposed, aimed at exploring concepts related to insecurity, satisfaction and social cohesion.

In Stage 2, the instrument is applied to a sample similar to the objective population (usually a small sample is enough). This sample is used as a basis for the exploratory and confirmatory factor analysis. The purpose of this is to verify the psychometric properties and identify the proposed latent variables;⁷ in other words, the validity of the constructs and reliability are tested and in this phase the instrument of measurement (questionnaire) is built, which measures the proposed constructs of the model.

In Stage 3, the analytical model proposed in Figure 1 is adjusted to estimate the coefficients and generate an empirical model based on data obtained from the National Survey of Public Spaces 2010 that was applied in various public spaces. With fitted model we are able to test the hypotheses.

⁷ The latent variables are not directly measured, but they are quantified through manifest variables (indicators, that are the actual questions from the survey) the latent variables are assessed with a measurement error model.

3.1 The sample

The study uses the survey carried out in Mexico by the Secretariat of Social Development's Recovery of Public Spaces Program (*Programa de Rescate de Espacios Públicos de la Secretaría de Desarrollo Social* or PREP-SEDESOL), in a population with medium-low and low socioeconomic levels located in urban and semi-urban areas. During the third quarter of 2010, 8,242 surveys were carried out in homes located in areas that had recovered of 271 public spaces in 2008, 2009 and 2010.⁸ The sampling method was a stratified random sample.

3.2 The structural equations model

Structural equations model (SEM) are useful for researchers who possess a theoretical background on a specific field of knowledge, and an analytic model that is supported by the theory. These models have the advantage of representing the complexity of reality, specifying the interrelations of the constructs involved. In addition, the variables involved in these models are latent constructs that represent subjective concepts that are measured through manifest variables, called a measurement error model. In these models there are exogenous variables (or latent predictors) as well as endogenous variables (or latent dependent variables). The models utilize the structure of covariance of the manifest variables and compare the sample covariance with variance implied by the theoretical model (Bollen, 1989:80-85; Raykov & Marcoulides, 2006).

A measurement error model is necessary to tap each one of the constructs; the manifest variables are the indicators that measure each construct; the latent variables are the unobserved variables that are measured by the manifest variables. For example, the measurement error model for social cohesion (a latent variable) is measured with nine manifest variables (e.g., willingness to help others, people get along well, people are trustworthy, etc.). The model in Figure 1 is used a guideline to fit a structural model by adding a measurement component to each construct.

The method of estimation used is maximum likelihood (ML) since data follows a multivariate normal distribution (Bollen, 1989:107). In order to adjust the model we use some fit indices. In the following section we describe some of these indexes that are helpful to assess the degree of fitness of the model to the data.

Among the fit indices are the chi square (χ^2) which is a measure for overall fit of the model to the data (Jöreskog & Sörbom, 1993). A significant χ^2 value indicates that the observed and estimated variance-covariance matrices differ, whereas a nonsignificant χ^2 value indicates that there is no significant difference. Hence, a nonsignificant χ^2 value with associated degrees of freedom implies that the model fits the data well (Kelloway, 1988). Although this test is the first to be developed is rarely used in applied research (Brown, 2006:81). Another index is called comparative fit index (CFI) proposed by Hu & Bentler (1999) and Bentler (1990). This index assesses the fit of the user specified model with respect to a more restrictive model, the null model. The range of CFI values are between 0 and 1, it is recommended values greater or equal to 0.90.

⁸ The public spaces in 2010 were currently in the process of recovering or had completed very recently

Unlike the other fit indices, RMSEA is based on the analysis of residuals, where smaller values indicate a better fit to the data. It has the advantage of going beyond point estimates to the provision of 90 % confidence intervals (Kelloway, 1988). In particular, RMSEA is a parsimony adjusted index. Its value decreases as there are more degrees of freedom (greater parsimony) or a larger sample size, keeping the others constant (Kline, 2011). Values less than 0.10 indicate a good fit to the data and values less than 0.05 indicate a very good fit (Schumacker & Lomax, 2004).

The paths linking two latent variables are named β -coefficients and are interpreted similarly as regression coefficients. For example, if the estimated coefficient linking the latent variable neighborhood insecurity (NI) to social cohesion (SC) is negative and significant ($b = -.16$; $p < 0.05$) this can be interpreted in the following way: an increase of the scores for NI in one unit decreases the scores of SC in 0.16 units, holding constant the remaining exogenous latent variables in the model.

3.3 Treatment of missing data

In this investigation missing data arises because respondents ignore items of the questionnaire or skip specific items for no apparent reason (item-missing values) that may lead to bias or lead to insufficient statistical power. There are several approaches to deal with missing data; one of these methods is a regression approach for data imputation in the context of structural equations (Muthén, Kaplan & Hollis, 1987). The authors propose using a regression model to predict missing data from available information. Building from this idea, another method is proposed in the context of structural equations named Full Information Maximum Likelihood (FIML; Arbuckle, 1996). FIML estimation is an approach that first uses maximum likelihood estimation for data subsets with complete values and then generates several covariance matrices with their corresponding likelihood functions. A combined likelihood function that incorporates all possible subsets of likelihood functions based on subsets of complete data is generated. With FIML, there is no actual data points are imputed. Instead, a maximum likelihood function estimates the parameters with the available data.

FIML computes many covariance matrices depending on the number of complete patterns in the data set. Each pattern is complete if it has a subset of variables from the original data set with no missing cases. A final maximum likelihood estimation procedure is constructed over all possible covariance matrices and generates a unique set of parameter estimates for the model. We used Mplus version 7.11 program to obtain the FIML estimates for the structural model (Muthen & Muthen, 2013).

4. Results

A national survey was undertaken in 2010, as described in previous paragraphs. Of the 8,242 surveys, 5,645 stated that they visited the public space located in their neighborhood. Of the activities performed, the most frequent was exercise (sports; especially in spaces focused on

sports) followed by visiting without a specific activity. Significant differences were found⁹ between men and women in activities performed most frequently. Men tended to exercise, followed by visiting without a specific activity (this category includes activities like walking, chatting and interacting with others etc.). Women were found to visit without a specific activity in mind, followed by doing exercise. Notable is the scant participation in cultural events, which can be explained by factors dealing with the availability of these types of events or by a lack of interest on the part of those that use the spaces. As pertaining to age, this exerts a determinate influence in the selection of activities to carry out in public spaces; in fact, significant differences were identified using the Chi-Squared test among age groups. Forty three percent of adolescents in the sample identified exercise (sports) as their most frequent activity, followed by play. The percentage of sporting activities descends to 30% after leaving youth and then progressively to 26% in adults older than 50. The activity of visiting without a specific activity is characterized by having an opposite evolution as its frequency increases by age.

The household questionnaire consists of 65 questions distributed in five sections, which are designed to evaluate public spaces and other questions to evaluate the neighborhood. This questionnaire contains the constructs: risk behavior in the neighborhood, perceived insecurity, satisfaction with the physical conditions of the space, social cohesion, infrastructure and residential satisfaction. The Cronbach's alpha for the constructs was satisfactory as the recommended minimum is 0.7 (Nunnally and Bernstein, 1994). Consult the Appendix for the actual wording of the items included in the questionnaire and the basic descriptive statistics.

Table 1.
Reliability Measures of the constructs*

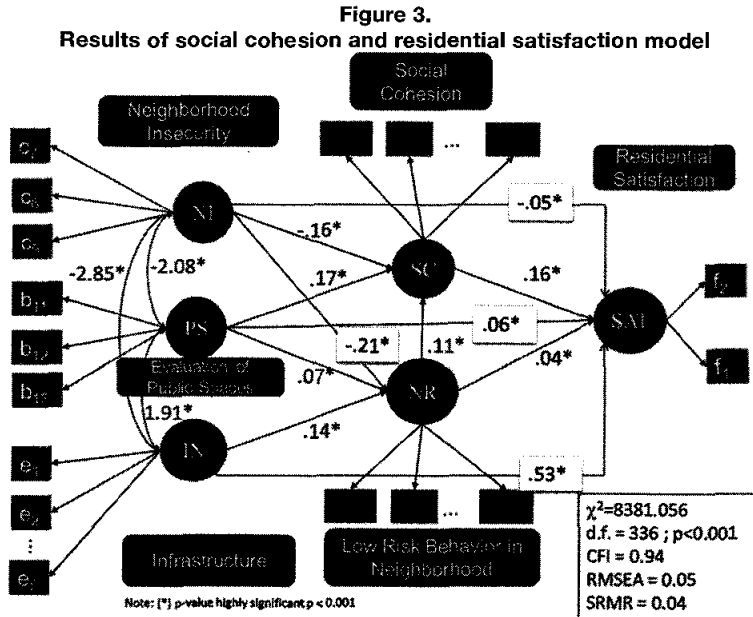
Construct (number of items)	Cronbach's Alpha
NR. Low Risk Behavior in the Neighborhood (6)	0.90
NI. Neighborhood Insecurity (3)	0.90
PS. Evaluation of the physical conditions of space (3)	0.89
SC. Social Cohesion (9)	0.90
IN. Neighborhood Infrastructure (3)	0.90
SAT. Neighborhood Residential Satisfaction (2)	0.77

(*) in parenthesis appears the number of items involved in each construct.

A structural equations model (SEM) was fitted to test the hypothesis previously stated, the model showed a good fit (CFI=0.94; SRMR=0.04, and RMSEA=0.050) and all parameter estimates were significantly loaded on the respective factors. As shown in Figure 3, results support all proposed hypothesis. The main argument is that the perceived neighborhood insecurity hinders major relationships in the community, reducing social cohesion (hence, social interactions) and residential satisfaction. In fact, neighborhood insecurity (NI) is negatively related to neighborhood infrastructure (IN; H_1 : covariance = -2.85; $p < 0.05$), negatively related to the physical conditions of space (PS; H_1 : covariance = -2.08; $p < 0.05$), negatively related to social cohesion (SC; H_4 : $b = -0.16$, $p < 0.05$) and residential satisfaction (SAT; $b = -0.05$, $p < 0.05$) and indirect through social cohesion. Also, perception of neighborhood insecurity (NI) hinders the

⁹ We used a chi-Squared test where the activities, which are nominal variables, were compared across other nominal categories.

perception of low risk behavior in the neighborhood (NR; $b=.21$; $p<0.05$), and therefore reduces residential satisfaction in an indirect fashion (H_6 : $b = -0.04$, $p<0.05$). Low risk behavior measures perceived control of potential violence and frequency of violent events in the neighborhood. Finally, there is a significant negative covariance between perception of insecurity (NI) and neighborhood infrastructure (IN; Covariance= -2.85 ; $p<0.05$) which indicates that high levels of insecurity are associated with deficient physical infrastructure.



On the contrary, satisfaction with the physical conditions of space (PS) promotes social cohesion (SC) in the community ($b=.17$; $p<0.05$), whereas high scores on physical conditions of public spaces (PS) are related to low risk behavior (NR; $b=.07$; $p<0.05$). The effect of satisfaction with public spaces (PS) on residential satisfaction (SAT) is both directly related to social cohesion (SC; $b=.06$; $p<0.05$) and indirect through low risk behavior (NR; $b=-.28$; $p<0.05$) because both paths are significantly supported.

Also, the positive coefficient between the variables infrastructure (IN) and high risk behavior in the neighborhood (NR; H_2 : $b=.14$; $p<0.05$) indicates that a perception of street deterioration is related to perceptions of high risk behavior. Likewise, a positive coefficient between the variables physical appearance of public spaces (PS) and low risk behavior in the neighborhood (NR) indicates that a dynamic public space reduces the perception of risky activities in the neighborhood.

As for the determinants of social cohesion, well beyond its initial purpose of health promoter through sports

and open-air activities. Conversely, a negative coefficient between the perception of high risk behavior in the neighborhood and social cohesion, suggest that social disorganization is inversely related to social cohesion.¹⁰

It is fundamental to underscore that social cohesion is the most important factor to improve residential satisfaction, due to the positive impact of social cohesion in the generation of a shared identity among neighbors.

5. Conclusions

Public spaces seem to be an effective instrument in promoting social cohesion and residential satisfaction. When individuals are able to become involved participating in public spaces, and transforming, the meaning of their physical and cultural activities, the transformative effects could reach beyond health and quality of life issues. These actors may feel that they are part of a greater whole and must be willing to give ground in terms of their personal interests for the greater good. Participating in public spaces (specifically in committees organizing activities within the public space) represent a first step to play a role in public affairs and deliberations, and place trust in society's institutions, as well as the people's greater sense of belonging to the community and solidarity with excluded and vulnerable groups, pave the way for the social covenants needed to underpin policies for achieving equity and inclusion.

However, social cohesion is a process that takes place over time, empirical evidence suggests that increasing levels of social cohesion appears after years of community work on the renovated public space. From qualitative studies we know that if a community appropriates the public space and a sense of belonging is developed then it is likely that the perceived social cohesion increase.¹¹ Therefore an important finding from this investigation is that social cohesion requires years of maturation through community work it does not appear just after beautification and renovation of public spaces. The nice physical appearance of the public spaces is necessary but not sufficient. Other factors are needed to explain how social cohesion might increase or decrease.

For example, social cohesion is negatively associated with neighborhood insecurity and positively associated with neighborhood disorganization that correlates with low levels of residential satisfaction. For public policy makers these findings are relevant for designing programs that incorporate members of the community in activities using public spaces; it is likely that perceptions of insecurity might decrease if children, youth, families and elder populations are integrated in the space with social activities creating social networks and a sense of community. On the other hand, the assessment of physical aspects of public spaces and perceptions of insecurity are negatively related with infrastructure of the neighborhood. In turn, nice public spaces are related with high scores of social cohesion, low levels of social disorganization and high scores of neighborhood infrastructure. These findings suggest that renovated public spaces might promote social cohesion through activities; further, families living nearby the beautified

¹⁰ It would be advisable to control for contextual variables such as job opportunities, job market to assure that the effect of social cohesion remains; however, no data is available to conduct such analyses.

¹¹ Longitudinal studies are needed to observe its evolution over time

public spaces improve their façade houses.¹² The findings suggests that it is not enough to rescue public spaces, (which is a necessary condition) but should be accompanied with policies that favor social interactions among members in the community to increase social cohesion.

Many things determine the process of social cohesion and it takes time to build a community and a nation. But social cohesion and social capital are elements that contribute to this goal, as Durkheim noted “A nation can be maintained only if, between the State and the individual, there is interspersed a whole series of secondary groups near enough in their sphere of action and drag them, in this way, into a general torrent of social life” (Durkheim, 1997:28).

¹² This fact possibly explains the high scores observed on perception of neighborhood infrastructure

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APPENDIX 1. VARIABLES FROM THE QUESTIONNAIRE INCLUDED IN THE MODEL

- **Neighborhood Insecurity (NI).** The scale was recoded, the value of 10 indicates too bad/low and 1 too good/excellent
 - C7R. - Rate the police surveillance in your neighborhood
 - C8R. - Rate the safety in your neighborhood during the day
 - C9R. - Rate the safety in your neighborhood at night
- **Evaluation of Public Space (PS)**
 - B11. - In general what is your rate of the facilities (public space)?
 - B12. - What is your rate on the illumination (public space)?
 - B13. - As for the physical aspect of the (public space) what is your rating?
- **Infrastructure (IN)** What is the rate of the
 - E1. - cleanness of the streets in your neighborhood?
 - E2. - street pavement condition (potholes, holes, etc.)?
 - E3. - appearance of sidewalks on your street?
 - E4. - street lighting?
 - E5. - physical aspect of your colony, overall?
- **Social Cohesion (SC)**
 - D1. - People who live in your neighborhood are willing to help other neighbors
 - D2. - The residents in your neighborhood get along well
 - D3. - Neighbors in your neighborhood are trustworthy
 - D4. - Neighbors in your neighborhood share the same moral values
 - D5. - I like to participate in neighborhood gatherings with my neighbors
 - D6. - I would ask for advice or help from my neighbors
 - D7. - Neighbors organize together to carry out activities that benefit the neighborhood
 - D8. - In general the relationship between the neighbors is good
 - D9. - I would ask a neighbor for a loan
- **Low Risk Behavior in Neighborhood (NR).** The items were recoded so that 10 indicate low risk and 1 indicate high risk.
 - C1R. - There are many gangs or groups in my neighborhood who commit criminal acts
 - C2R. - There are many drunkards people in my neighborhood
 - C3R. - People are afraid of being mugged in my neighborhood
 - C4R. - There are robberies on the streets and in the houses of my neighborhood
 - C5R. - Drugs are sold and consumed on the street in my neighborhood
 - C6R. - Violence against women happens frequently in my neighborhood
- **Residential Satisfaction (SAT)**
 - F1. - How satisfied are you with the way your neighborhood looks?
 - F2. - Think about the ideal colony and compare it to the current situation of your neighborhood. What would be the rating of your neighborhood compared to the ideal?

APPENDIX 2. DESCRIPTIVE STATISTICS OF THE VARIABLES INCLUDED IN THE MODEL

Variables	N	Mínimo	Máximo	Media	Desv. típica
C1R.- There are many gangs or groups in my neighborhood who commit criminal acts	8094	1	10	5.47	2.81
C2R.- There are many drunkards people in my neighborhood	8146	1	10	4.95	2.76
C3R.- People are afraid of being mugged in my neighborhood	8082	1	10	5.28	2.79
C4R.- There are robberies on the streets and in the houses of my neighborhood	8027	1	10	5.20	2.83
C5R.- Drugs are sold and consumed on the street in my neighborhood	7190	1	10	5.74	2.97
C6R.- Violence against women happens frequently in my neighborhood	8229	1	10	6.53	2.77
C7R.- Rate the police surveillance in your neighborhood	8195	1	10	5.74	2.65
C8R.- Rate the safety in your neighborhood during the day	8185	1	10	5.22	2.69
C9R.- Rate the safety in your neighborhood at night	8161	1	10	5.86	2.73
D1.- People who live in your neighborhood are willing to help other neighbors	8063	1	10	6.86	2.15
D2.- The residents in your neighborhood get along well	8135	1	10	6.98	2.06
D3.- Neighbors in your neighborhood are trustworthy	8031	1	10	6.82	2.18
D4.- Neighbors in your neighborhood share the same moral values	7734	1	10	6.29	2.40
D5.- I like to participate in neighborhood gatherings with my neighbors	8126	1	10	6.66	2.45
D6.- I would ask for advice or help from my neighbors	8032	1	10	6.61	2.50
D7.- Neighbors organize together to carry out activities that benefit the neighborhood	8055	1	10	5.85	2.72
D8.- In general the relationship between the neighbors is good	8145	1	10	6.96	2.19
D9.- I would ask a neighbor for a loan	7970	1	10	4.93	3.07
E1.- What is the rate of the cleanness of the streets in your neighborhood?	8226	1	10	5.66	2.48
E2.- What is the rate of the street pavement condition (potholes, holes, etc.)?	8178	1	10	5.23	2.72
E3.- What is the rate of the appearance of sidewalks on your street?	8153	1	10	5.40	2.69
E4.- What is the rate of the neighbors in your neighborhood share the same moral values	8204	1	10	5.93	2.66
E5.- What is the rate of the physical aspect of your colony, overall?	8197	1	10	6.07	2.40
F1.- How satisfied are you with the way your neighborhood looks?	8194	1	10	6.63	2.07
F2.- Think about the ideal colony and compare it to the current situation of your neighborhood. What would be the rating of your neighborhood compared to the ideal?	8130	1	10	6.13	2.30
N válido (según lista)	6028				