**Networks and space in personal networks of poor urban Brazilians**

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**Abstract**

Since the 1970s, researches using social network analysis have improved substantially our knowledge about the configurations of social ties present in different social situations, on the processes which produce them and on their role in social support. Urban space is present in several of these studies, although concentrated in cities of the Global North, but not so many investigations explored its role in network production. This paper discusses the relationships between space and networks using research results about 361 personal networks of individuals in poverty who live in two Brazilian metropolises – São Paulo and Salvador. Previous results from this same research showed that physical proximity is relatively unimportant for the middle classes, but tends to central for the urban poor. Using a series of quantitative analyzes, this article explores the influence of residential segregation and of neighborhoods on network characteristics and dynamics. Both segregation and localism have negative impacts on the presence of more socially integrated networks. Although several other social attributes also influence relational patterns, the results suggest strong mechanisms of inequality reproduction. While some types of networks may contribute to better integrate poor individuals, they tend to rarer exactly among the persons already isolated by space.

The importance of social contacts and of spatial proximity for sociability is a classical theme in social studies, at least since Georg Simmel. Recent researches using social network analysis showed the importance of networks in different social situations, including social support, although strongly concentrated in cities of the Global North.

The relationships between networks and space, specifically, have also been explored by several studies in different countries. In fact, it is undisputable now that networks and space are two of the most important middle range structures in which social integration occurs. Space is important because location, contiguity and distances influence directly the production and maintenance of social activities and contacts. Networks, on the other hand, are paramount for both creating social cohesion and connecting different social circles, promoting social integration. Regardless of this general agreement, different recent lines of analysis gave diverging emphasis to the importance of each of these elements. The social support literature (Fischer, 2011) and poverty debates (Briggs, 2003 and Mustered and Murie, 2005) highlighted the joint important of space and networks, each one counterbalancing the other. On the other hand, the research agenda on contemporary communities, inspired mainly by Wellman (2001), suggested that networks have been substituting space in social integration in recent decades. In both cases, however, the precise effects of space on networks were rarely investigated.

It is well known that networks and attributes are jointly produced through the life trajectory of the individuals. So, the effects of ‘segregation on networks’ and of ‘networks on segregation’ happen simultaneously and their true distinction is impossible. All the analyses, thus, present some degree of endogeneity. But departing from the acknowledgement of this multiple causality, it is possible to focus the analysis on one of these two associations, without ignoring the other. This article intends to contribute exactly to this by concentration its attention on the effects of space on networks.

The paper studies personal networks of 361 individuals in poverty who live in two Brazilian metropolises – São Paulo and Salvador, as well as 30 middle class personal networks, used as a benchmark. The research produced primary data on personal networks, instead of using egocentered networks constructed by surveys, what allowed the analysis of sociability without delimiting network sizes previously. The studied individuals live in twelve sites which differ strongly in terms of housing and segregation conditions. The results showed that physical proximity is relatively unimportant for the middle classes, resonating Wellman (1999), but is central for the urban poor, what may compliment present discussions on cities of the Global North. To test the effects of space on personal networks, the article analyzes quantitatively if and how network measures are affected by residential segregation, spatial proximity of dyads and the presence of neighbors in the networks.

The article is organized around three sessions, not considering this introduction and the conclusion. In the following session, I briefly sketch the debates about sociability and the role of space on network production. The second session situates the reader, summarizing our previous research results and research design. The third session investigates the associations between network measures, segregation and indicators of spatial processes. At the end, a final session summarizes the most important findings.

1. **Recent debates on personal networks and space**

Recent researches using social network analysis have improved substantially our knowledge about the different configurations of social ties present in various countries (Fischer and Shavit, 1995; Grossetti, 2007; Bastani, 2009, Ruan et al., 1997; Lonkila 2010; Bidart et al., 2011; Fischer, 2011; Bichir and Marques, 2012), rural and urban scenarios (Beggs, 1996), and institutional settings (Small, 2009; Doreian and Conti, 2012). We have also learned about the relationships between individuals attributes and networks (McPherson et al, 2006), their joint role in social support (Uehara, 1990) and about the processes that lead to network production (Grossetti, 2005 and 2009; Degennes, 2009). Networks also brought new interpretations to the contemporary meaning of community (Wellman, 2007) considering communication technologies and other recent changes in demography and the economy (Wellman, 2001; Fischer, 2011) but also considering the influence of literally ‘modern’ technologies, such as the automobile (Freeman, 2001).

Of special interest to this paper, recent debates concentrated in the Global North have discussed the multiple connections between networks and space. Some authors showed how networks are affected by housing choices and mobility (Curley, 2008 and 2009; Lee, 1980; Kleit and Carnegie, 2011), as well as by migration (Molina et al., 2008; Lubbers et al., 2010). Many other studies followed Wilson (1987)’s agenda trying to specify the mechanisms of poverty production (and reproduction) involving networks, poverty and space (Schweizer et al., 1998; Briggs, 2003 and 2005; Mustered et al., 2006; Ferrand, 2002; Marques, 2012; Lee et al., 2005). In general terms, the analysis of neighborhoods and networks became a major theme for both urban studies and sociology.[[2]](#footnote-2)

This relationship between networks and space has been studied departing at least from two broad hypotheses. A first one stresses the complementary of space and networks for social integration. This is the case of the debates on living conditions, social support and poverty (Briggs, 2001 and 2003; Campbell and Lee, 1991; Mustered et al., 2006; Marques, 2012, Bichir and Marques, 2012). Following classical hypotheses about urban poverty raised by Wilson (1987), this literature considered residential location (and segregation) as key for status attainment and for poverty in particular. Networks, however, could counterbalance the isolation produced by segregation, giving access to material and immaterial goods and to social integration. Consequently, networks should be superposed to space in the study of poverty, although the effect of space on networks was not at the forefront of the analyses. Authors working on social support and on sociability in a broader sense stressed a similar superposition between residential location and networks (Campbell and Lee, 1992; Uemura, 1990; Ferrand, 2002; Bidart et al., 2011; Fischer, 2011).

In a second line of reasoning, Wellman (1999) and followers sustained that the supposed disappearance of communities in large cities of the Global North in fact meant a transformation of territorially bounded communities into ‘personal communities’ tied by social networks enabled by information technologies. In this case, networks would be substituting space in the production of communities. This idea of community has been criticized by Blokland (2003), but the general argument presents eloquence to describe at least some of the recent transformations of sociability for specific social groups and social realities. Its generalization, however, may be more problematic and probably describes poorly the situation of poor social groups even in the Global North. And, it certainly does not describe the sociability of poor individuals in cities of the Global South, as we will see latter.

Regardless of the vitality of these debates, however, there are two important absences, which situate the contribution of this paper. First, the presence of cities of the Global South is relatively rare in the literature, restricting comparisons and turning theory building more difficult. More important, present debates do not specify exactly the effects of different spatial elements on personal networks. This article intends to contribute to fill this gap by analyzing quantitatively the effects of segregation, localism and the presence of neighbors on networks characteristics. Segregation isa spatial feature associated with urban structure and defined by the distribution of social groups in space. Localism, differently, is a network characteristic associated with the larger or smaller presence of local contacts on someone’s sociability. I measure localism by the proportion of the nodes of a personal network which live in the same place as the ego. Additionally, the article explores a third spatial element associated with the presence of neighbors in personal networks.

Before entering the analysis, however, it is important to give to the reader some information about previous results of this research, as well as about its design.

1. **The research**

The investigation analyzed social networks of individuals in poverty in two Brazilian metropolises – São Paulo and Salvador. The study surveyed the personal networks of 361 individuals living under conditions of poverty, as well as of thirty middle-class individuals from São Paulo, in order to establish a standard of comparison. Approximately thirty networks were mapped in each of the 12 study sites in two Brazilian metropolises - seven in São Paulo and five in Salvador. São Paulo and Salvador are two of the largest and most important Brazilian metropolises, but they present very different characteristics in terms of job market, social structure, poverty profile and segregation patterns.[[3]](#footnote-3) The research sites in each city varied in terms of distance to the center, degree of consolidation, construction patterns and level of state intervention (Marques, 2012c). The list of research sites included five favelas (three in São Paulo and two in Salvador), two central areas with precarious tenements (one in each city), two housing projects (a vertical one in São Paulo and a horizontal settlement in Salvador) and three mixed areas of favelas and irregular settlements (one in São Paulo and two in Salvador).[[4]](#footnote-4) Middle-class participants were selected from a wide spectrum in São Paulo, with the sole aim of serving as a standard of comparison for the analysis of the poor.

The research analyzed personal networks, instead of survey egocentered networks as the majority of the literature on social support. This decision created substantial challenges for data collection and processing, but gave access to much richer information about the networks, avoiding the predefinition of their size, structure or boundaries. Interviewees were selected on site at random in both weekdays and at weekends. The data were collected in interviews based on a semi-open questionnaire and on a name generator. For each of the nodes I surveyed two attributes, both considering the interviewee interpretation: if the person lives in the same place as the ego; and in which sphere of sociability the relationship takes place. The first information allows the analysis of localism, defined as previously discussed. The second information - spheres of sociability, delimitates ‘regions’ of the sociability of the ego in which social interactions occur. This allowed me to classify and compare sociability profiles, besides exploring network measures. This sociability information, however, is different from the type of tie or from the attributes of the nodes. It is relatively common to have, for example, relatives connected to the ego by friends in the sphere of the neighborhood. The idea is to map the sociability of the interviewee as it makes sense for him/her and in his/hers own terms. It is reasonable to consider that some spheres – family and neighbors, for example, tend to be potentially more homophilic, contrary to what is expected in spheres such as work, church, civic associations and studies, since in these latter spheres individuals tend to meet more heterogeneous people in terms of social attributes.

These data were handled using social network analysis tools, resulting in 361 personal networks of individuals in poverty and 30 networks of middle class individuals. After running the statistical analyses, I intentionally chose a set of forty interviewees (twenty in each city) to comprise the qualitative part of the study in order to explore how the individuals use the networks in their daily lives. This article, however, is based mainly on the quantitative information of the research, and I refer the reader to other pieces about the qualitative results (Moya and Marques, 2013; Marques, 2012a).

Several previous publications of this research explored different dimensions of the effects of the networks on poverty. The overall association between networks, segregation and poverty in São Paulo was analyzed in Marques (2012a). When compared to the middle-class networks, the personal networks of the poor were, on average, much smaller (53 in São Paulo and 41 in Salvador, against 93 nodes for the middle classes), more local (63.5% in Salvador and 60.5% in São Paulo against 20% local for middle class networks) and less varied in terms of sociability (3.8 different spheres in São Paulo and 3.5 in Salvador, against 5.5 for the middle classes). Inter-relations between different social and income groups were practically inexistent. The poorer city – Salvador - presented slightly smaller, more local and less varied networks, although these differences tended to disappear when compared with the São Paulo middle class.

Physical proximity was relatively non important for the middle classes – only 5% of the nodes of these networks lived in the same place of residence, resonating the community hypothesis stated by Wellman (1999). However, localism among the poor was much higher, reaching 32%, on average. Regardless of the differences between social groups, the networks varied substantially within each group (Bichir and Marques, 2012). To explore this variability, I developed a typology of networks and another one of sociability patterns. The combination of these typologies suggested the existence of four relational situations with different degrees of homophily. The typology also suggested that a part of networks presented a less local sociability, largely generated within organizations (work, church, union), which were potentially less homophilic. This relational pattern was associated with middle sized networks with organizational sociability.

The analysis that followed specified the impacts of the networks on social and economic conditions (Marques, 2012a) and their mobilization to solve daily problems (Marques, 2011). It became clear that employment, including jobs with greater levels of protection, and the absence of social precariousness, tended to be positively influenced by less local and less primary patterns of sociability (Marques, 2012b and 2012c). Variables such as age and income did not feature as significant, but two traditional variables - household size and educational level, as well as networks and sociability, explained a significant part of family per capita revenues. Segregation presented significance and a negative sign – individuals living in segregated places tended to have lower income. It is important to notice that this result appeared weaker in the case of São Paulo alone (Marques, 2012a and 2012b). In this case, segregated individuals who had varied sociability tended to have higher income, but this effect disappeared with the introduction of more cases from Salvador and a more straight forward negative effect of segregation on income was present.

Three network measures also showed themselves to be relevant to explain income, namely:

1) type of network and sociability – middle-sized networks with organizational sociability (which are also not so local) had positive effects on income;

2) variability of sociability – more varied sociability was associated with higher income;

3) network size – individuals with larger networks tended to have higher income, but only when they had an occupational situation which provides stable income[[5]](#footnote-5);

So, both segregation and localism (included in the type of network/sociability) had important effects of income, job status, occupational tenure and social precariousness. The qualitative part of the research explored how individuals used their networks to solve daily problems and to get social support (Marques, 2011). I also investigated the social mechanisms embedded on the networks which explain poverty reproduction (Marques, 2012a).

But regardless of the relevance of these results, the effects of space on networks stayed unexplored. In the following session, I invert the logic and explore the effects of spatial dimensions on the personal networks of poor individuals in the two cities.

1. **Segregation and localism in the two cities**

I start by exploring simple measures to characterize segregation and localism in the networks. Among the research sites, four locales were considered segregated in São Paulo (among seven sites) and two in Salvador (among five sites)[[6]](#footnote-6).

Some basic differences arise already from simple average comparisons between networks of segregated and non-segregated individuals.[[7]](#footnote-7) Networks are systematically larger in segregated places (51 against 45 nodes), but with lower degrees (11 against 9), on average. They also tend to have more clustered sub-groups in segregated places (27 2-Nclans, on average, against 20 in non-segregated places). In terms of sociability profile, the relative presences of the spheres of family and friends are smaller (43 and 4 against 38% and 7%, respectively), but are larger for neighbors and church (34 and 6 against 29% and 3%, respectively).

Localism tends to be high among the poor, but varies slightly between cities - 63.5% in Salvador against 60.5% in São Paulo. Localism among the middle class individuals is much lower – around 18%. In terms of networks characteristics, localism tends to be negatively correlated with the variability of sociability – higher localism is associated with lower numbers of sociability spheres and with also lower presence of ties between spheres.[[8]](#footnote-8) In terms of sociability profiles, higher localism is associated with lower relative presences of family and work. So, more local networks tend to be less varied in terms of sociability and tend to have fewer ties in the family or in the work spheres.

The different levels of localism found in the two cities could be product of differences in sociability profiles by city. However, the data show that sociability profiles in the two cities tend to be similar, on average, being family and neighbors the most frequent spheres (with 40 and 32% of the nodes, respectively). Work, friends, church and studies appear next (with 8, 6, 5 and 3%, respectively).

The differences could also be explained by different incidences of localism by sphere. The following graph tests this, by presenting the proportional presence of local nodes per sphere of sociability in each city.

As we can see, the most local sphere is neighborhood, followed by church, family and friends. Even in the case of the less local sphere – work, however, the average localism rate is considerably higher than for the middle classes – which had 18% of local nodes, considering all spheres. We can also see that localism tends to be higher in Salvador for all spheres, even for work and studies. Besides, the differences tend to be higher in the potentially less homophilic spheres – church, work and studies, reducing potentially the possibilities of heterophily in the networks.

**Figure 1: Proportion of localism per sphere and city (%)**

Source: Interviews and field work.

Therefore, we can summarize these results stating that networks in segregated places tend to be, on average, larger and more clustered, with sociability more concentrated in neighbors and church and less in family and friends. Family and friends tend to be the most common spheres. The net balance in terms of homophily is not clear, since family, neighbors and friends all tend to be homophilic spheres of sociability. Localism is much higher among the poor than among the middle classes and tends to be higher in Salvador than in São Paulo. Higher localism is associated with less varied networks and is higher in Salvador, for all spheres.

However, we know that networks measures are correlated among themselves, as well as with social attributes. In the case of our networks, for example, income is negative correlated with localism and years of schooling is correlated with size of the network. So, for example, the already mentioned associations between size and segregation or between sociability variability and localism might in fact be caused by social attributes correlated with segregation. To control for this, I develop in the following session a series of multivariate quantitative tests in order to separate and confirm the effects of segregation and localism.

1. **Effects of attributes and spatial dimensions on networks and sociability**

To test the role of space on networks, I performed a series of multivariate quantitative to explore, successively: 1. what explains the most importance network measures (and what are the roles of the spatial dimensions of sociability)? and 2. what explains the spatial dimensions of sociability, themselves. These tests involved the analysis of: size, variability of sociability, organizational sociability, localism and the proportion of neighbors in the networks. All analyzes include only the 361 individuals in poverty.

Size and variability of the sociability are among the most important network characteristics. They tend to be correlated[[9]](#footnote-9) (as are several other network measures), but are associated with quite different processes. Variability of the sociability is correlated with income[[10]](#footnote-10), for example, differently from size. In my previous analyzes, as already stated, middle sized networks with organizational sociability was the relational situation associated with the best living conditions among the poor. And, finally, I explored the main conditioning factors behind the most important spatial characteristics of networks - localism and the proportion of neighbors in personal networks.

**Exploring network size and variability of sociability**

I start by testing the indicators and variables associated with network size, measured by the number of nodes of each network. Since the number of nodes is strongly skewed to the right (smaller number of nodes are much more frequent), I used a natural logarithm transformation for a linear regression. The following table presents the results. As we can see, among all the variables tested, eight survived in the model. A dummy variable for city was not significant, showing that when other variables are accounted for, the differences between cities disappear.

**Table 1. Linear regression coefficients - Ln(Nodes)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|  | B | Std. Error | Beta |
| (Constant) | 2,616 | ,073 |  | 35,615 | ,000 |
| years of schooling | ,014 | ,005 | ,096 | 3,008 | ,003 |
| elderly (60 years or more) | -,211 | ,065 | -,099 | -3,250 | ,001 |
| # Spheres | ,151 | ,017 | ,292 | 9,128 | ,000 |
| # 2-clans/total number of nodes | ,013 | ,001 | ,607 | 19,540 | ,000 |
| High presence of countrymen (>21%) | -,130 | ,039 | -,100 | -3,342 | ,001 |
| Sphere church (%) | ,005 | ,002 | ,077 | 2,584 | ,010 |
| Sphere neighborhood (%) | ,004 | ,001 | ,137 | 4,495 | ,000 |
| E-I neighborhood | -,141 | ,053 | -,079 | -2,683 | ,008 |

Notes: Adj R2=0.597; N=360 cases (one outlier); Durbin Watson=2.033; Condition Index= 12.65.

Two social indicators survived in the model – years of schooling and being elder. In the two cases, the results obviously point out to processes of network formation and transformation. The direction of the effects, however, is opposite. Schooling tends to enlarge the networks, what is expected, since educational environments are known to have an important effect on networks. On the other hand, old age contributes to reduce network size. This is also expected considering the social isolation effects of old age and of the decline of networks through the last phases of the life cycle, more broadly (Bidart and Lavenu, 2005; Marques and Bichir, 2012).

Then the model presents several networks measures affecting size. First, the variability of the sociability (measured by the number of spheres) and the presence of clustered subgroups (measured by the # 2-clans, divided by the number of nodes)[[11]](#footnote-11). In both cases the signs are positive, so networks with more varied sociability tend to be larger, as well as networks with several clustered subgroups. In the first case it is reasonable to interpret that when sociability becomes more varied, a larger number of alters is available for possible contacts. In the second case, however, it is more difficult to separate a causal direction and decide if it is the growth of the network which leads to the formation of more clusters, or the presence of dense sub-groups which leads to the growth of the network. In any case, size and dense subgroups reinforce each other.

Finally, the model presents four variables associated with sociability. The presence of many countrymen in the networks tends to reduce the size of the network. A considerable amount of the Brazilian metropolitan poor are migrants from the poorer regions of the country. Previous results of this research showed that some individuals maintain, at their present location, a very intense sociability with persons who migrated from the same state, or sometimes from some small village. This is not a general phenomenon, but characterizes a subgroup of individuals, who live in almost ‘transplanted communities’ and for whom the integration process after migration happened in a very specific way. The model is informing us that this process tends to reduce the size of the networks, what can be interpreted as a creation of limits for growth.

On the other hand, social interaction in the church sphere tends to enlarge the networks. The effect has also been described in the literature and in the Brazilian case involves the traditional catholic churches, but also the many neopentecostal temples which grew intensely in recent period. While the first dimension leads to homophilic ties, the church sphere tends to be more heterophilic, even when it is local (Marques, 2012a).

The final two variables have a clear association with the main concern of this article. The presence of more intense sociability in the neighborhood tends to increase the networks and a higher proportion of ties between local and non-local nodes reduces the size of the network.[[12]](#footnote-12) In both cases, this suggests that local sociability tends to increase the networks. And in fact the qualitative narratives of the research confirm this, by suggesting that developing activities locally is one of the ways of expanding the network. A substantial amount of the local ties of the larger networks, however, tend to involve acquaintances tied only by interactions, instead of relations in Degenne (2009)’s sense. It is interesting to add that the above mentioned countrymen tend to be local (and have negative sign, as we saw), but the effect of local contacts is so strong that survives as a distinct and positive effect.

**Varied sociability**

Although varied sociability contributes to larger networks, it involves a different group of processes and is explained by different variables. I performed a similar test with linear regression of several variables to explain the total number of spheres as measure of varied sociability. The results are presented in the following table. As we can see, eight variables survived in the model.

**Table 2. Linear regression coefficients - # Spheres**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|  | B | Std. Error | Beta |
| (Constant) | 2,940 | ,213 |  | 13,822 | ,000 |
| São Paulo | ,266 | ,106 | ,116 | 2,510 | ,013 |
| Years of schooling | ,053 | ,013 | ,182 | 3,914 | ,000 |
| Nodes | ,018 | ,002 | ,453 | 7,829 | ,000 |
| # 2-clans/total number of nodes | -,910 | ,307 | -,173 | -2,968 | ,003 |
| Sphere church (%) | ,020 | ,005 | ,172 | 3,866 | ,000 |
| Sphere work (%) | ,016 | ,004 | ,166 | 3,569 | ,000 |
| Local persons (%) | -,005 | ,002 | -,112 | -2,442 | ,015 |
| Segregated | -,203 | ,103 | -,089 | -1,976 | ,049 |

Notes: Adj R2=0.323; N=358 cases (three outliers); Durbin Watson=2.16; Condition Index= 12.40.

In this case, city differences did not disappear in the multivariate model and the São Paulo cases present systematically higher variability of sociability, even in face of the other variables. Years of schooling appear again with a positive and significant effect, increasing the probability of more varied networks for more schooled individuals. The number of nodes appears as positive and significant, what was expected considering our interpretation of the results of the previous regression. Another variable which also appears again is the existence of cohesive sub-groups (measured by the 2-clans per node),[[13]](#footnote-13) this time with a negative sign. This suggests that networks with many cohesive sub-groups tend to be larger, but less varied in terms of sociability. Intense clustering leads to a closure effect in the networks, regardless of size.

Then, the model presents two variables associated with sociability but with opposite signs: while a higher proportion of nodes in the work sphere affects positively the variability of the sociability, larger relative sizes of the church sphere tend to reduce the variability of the sociability. These two spheres are both associated with organizational environments and Marques (2012a and 2012b) found a similar effect of these spheres on income, job status and job tenure. Table 2 suggests, however, that these spheres have opposite effects in terms of the social content of their sociability – helping to open new spheres (at work) and contributing to close them (on churches).[[14]](#footnote-14)

Finally, the two bottom lines of the table concern spatial variables, both with negative effects. The larger the degree of localism of a network, smaller is its variability. Leading to the same direction is the information that persons who live in segregated places have less varied sociability. So, both localism and segregation impact negatively the variability of sociability, contributing to closure. Since varied sociability is associated with better living conditions, both segregation and localism impact negatively living conditions, not only directly, what has already been established by the literature, but also via networks.

**Middle networks with organizational sociability**

The previous results of this research about the effects of networks on poverty showed that middle networks with sociability concentrated on work, church or associations were associated with better living conditions in terms of income, job status, job tenure and social precariousness (Marques, 2012a). Apparently, this kind of network/sociability tends to be less local and less homophilic than larger or smaller networks concentrated in the spheres of family, friends and neighbors. So, I test here also what are the main conditioning factors of this relational pattern. Since in this case the dependent variable is discrete - having or not this type of network/sociability, I perform a logistic regression. Considering that the dependent variable was constructed from network measures and sociability profiles, the analysis includes only social attributes and spatial variables, excluding all relational data. The results are presented in the following table. As we can see, only four variables survived in the model.

**Table 3. Logistic regression coefficients – Middle networks with organizational sociability.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B | S.E. | Wald | Sig. | Exp(B) |
| Constant | -1,034 | ,563 | 3,379 | ,066 | ,355 |
| Income (family per capita) | ,376 | ,168 | 4,980 | ,026 | 1,456 |
| Young (less than 21 years) | 1,182 | ,429 | 7,588 | ,006 | 3,260 |
| Local persons (%) | -,015 | ,005 | 7,863 | ,005 | ,985 |
| Segregated | -,740 | ,253 | 8,571 | ,003 | ,477 |

Notes: Percentage correct = 73,4%; Chi-square = 36. 709 (sig 0.000); Pseudo R2 (Nagelkerke) = 0.140; N = 361.

In this case, the model informs us about a positive and significant association between per capita family income and this type of network/sociability. This is consistent with the reported previous results which showed that individuals with higher income have more frequently this relational pattern, even among the poor. Younger individuals (with less than 21 years of age) also present a higher probability of having this relational pattern. This quantitative result is supported by qualitative information which suggested a less homophilic relational pattern among youngsters.

The last two variables in the model are spatially related and present more interest to this analysis. First, localism affects the presence of this network/sociability negatively – more local sociabilities are more rarely associated with this type of network. Localism, therefore, tends to enlarge the presence of more homophilic relational patterns. Finally, segregation is significant, but has a negative sign, suggesting that individuals who live in segregated locales tend to have this network/sociability less frequently. Since this kind of relational situation promotes social integration and is strongly associated with better living conditions, segregation plays a clear negative role here. The effects of both variables point out to certain circular and cumulative effects, since the more isolated individuals in terms of localism and segregation are also the ones for whom the more integrative relational pattern is less frequent.

**Localism**

Then, I investigate the determinants of high localism, defined as the networks in which more than 83%[[15]](#footnote-15) of their nodes are local. This condition was investigated using a dummy variable considering this threshold in a Multinominal Logistic regression model. I opted to dichotomize localism and to use of a multinomial logistic since it would be incorrect to submit the data to a regression analysis, considering that the indicator is a proportion, bounded by 0 and 100%. Table 4 below presents the resulting model. As can be seen, only four variables survived in the model.

**Table 4. Logistic regression coefficients - High Localism**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B | S.E. | Wald | Sig. | Exp(B) |
| Constant | ,910 | 1,159 | ,616 | ,432 | 2,483 |
| # Spheres | -,622 | ,234 | 7,052 | ,008 | ,537 |
| E-I neighborhood | -7,516 | ,912 | 67,842 | ,000 | ,001 |
| Sphere family (%) | -,067 | ,015 | 19,589 | ,000 | ,935 |
| Sphere work (%) | -,041 | ,020 | 4,346 | ,037 | ,959 |

Notes: Percentage correct = 93.5%; Chi-square = 191.612 (sig 0.000); Pseudo R2 (Nagelkerke) = 0.668

As we can see, the variability of sociability affects negatively the presence of high localism. This result is expected not only logically, but also because localism has a negative effect on varied sociability, as we saw in one of the previous regressions. The model presents another expected result associated with the E-I of neighborhood - local networks are more based on ties between local or non-local nodes, but not on ties which bridge local and non-local nodes. The model also presents two variables associated with sociability profiles. The relative presence of ties in both the spheres of work and family decreases the probability of highly local networks. The first result was expected, since work tends to be associated not only with less homophilic patterns, but also less local relational patterns. The second result is less expected, since a substantial part of the family sphere is local (49% in São Paulo and 58% in Salvador). But if we consider that family and neighbors are the two most important homophilic spheres, it is logic that increases in one of them may lead to decreases in the other.

**Persons in the neighborhood sphere**

Finally, I test the conditioning factors of high relative size of the neighborhood sphere in the networks. As already stated, this information differs from the number of neighbors. In fact, as we saw in Figure 1, the neighborhood sphere is not even composed only by local people (90% in São Paulo and 91% in Salvador). But by investigating the relative size of the neighborhood sphere we may measure the importance of neighborhood as a region of the sociability of the individuals, defined as understood by the interviewees. The analysis of the data suggested that 47% is a good threshold for the networks of the poor in the two cities[[16]](#footnote-16). So, the data were dichotomized considering this limit and submitted to another multinomial logistic regression, since the indicator is again a proportion. The resulting model is presented in Table 5 below.

**Table 5. Logistic regression coefficients – Many neighbors (>47%)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | B | S.E. | Wald | Sig. | Exp(B) |
| Constant | -,543 | ,471 | 1,330 | ,249 | ,581 |
| Nodes | ,032 | ,006 | 29,736 | ,000 | 1,033 |
| # Spheres | -,527 | ,164 | 10,313 | ,001 | ,591 |
| Sphere work (%) | -,048 | ,018 | 7,442 | ,006 | ,953 |
| Sphere church (%) | -,074 | ,028 | 6,819 | ,009 | ,929 |

Notes: Percentage correct = 79.2%; Chi-square=70.227 (0.000); Pseudo R2 (Nagelkerke) = 0.274; N = 361.

As we can see, four variables stayed in the model, all of them relational. First, the model indicates that size is significant and positive. Consequently, larger networks tend more frequently to have a higher presence of individuals in the neighborhood sphere. This result is expected and was already present in the first regression. Then, the model presents another intuitive result: the number of spheres, on the contrary, is significant and negative, suggesting that more varied networks are associated with lower sizes of the neighborhood sphere.

Additionally, the analysis presents two variables associated with sociability profiles with significant and negative signs – work and church. This result might be considered spurious, since the proportions of sociability by sphere sum 100%. However, four spheres (family, friends, associations, studies) were not associated statistically with the relative size of the neighborhood. So, we may state that networks with a high presence of nodes in the work and the church spheres tend to have smaller neighborhood spheres. The result is intuitive, since both spheres are organizational and tend to be associated with less homophilic relational patterns.

**Summarizing the effects**

I summarize here the results presented by the models, starting from social indicators. Differences between cities exist, but tend to disappear in face of the other variables, except for the variability of the sociability, higher in São Paulo than in Salvador. Among social attributes, years of schooling appeared associated positively with both size and networks variability, while income enlarged the odds of the presence of middle networks with organizational sociability. All three evidences confirm a more intense and ample social integration of individuals with better social status, what certainly has consequences for inequality reproduction. This also suggests circular mechanisms leading to the reinforcement of the social isolation of the elderly. The elderly tended to have smaller networks and youngsters tend to have middle networks with organizational sociability more frequently. Finally, the presence of many countrymen in the network tends to reduce network size, probably by the formation of intense closure in the networks of the individuals who experiment this phenomenon. So, migrants who experience a superficial integration to the present places of living are constrained in terms of the scale of their sociability. But this affects only some migrants, and for the large majority of them, the effect does not exist.

Size of the networks impacted positively the variability of the sociability, as well as the presence of high localism, what presents somewhat opposite consequences in terms of social integration. In fact, the results suggested that more local networks have more intense sociability, although more homophilic, as will be discussed in the following. Variability of the sociability, on the other hand, impacted positively the size of the networks and negatively the presence of high localism and large persons in the neighborhood sphere. The consequences of variability of sociability, therefore, are clear and promote more intense social integration. The presence of many dense clusters in the networks (measured by 2-clans) presented positive effect on network size, but negative effects on the variability of sociability.

The high presence of individuals in some spheres of sociability also impacted the analyzed indicators. The presence of the family sphere is associated with lower localism and with smaller neighborhood spheres, what might appear counterintuitive. However, if we consider that these are the two main homophilic spheres, it is logic that the growth of one of them leads to the decrease of the other. Moreover, the analyses have shown that higher presences of individuals in the church sphere are associated with larger network sizes, with broader variability of sociability and with smaller probabilities of high localism. Therefore, the church sphere contributes to more ample social integration, what is compatible not only with the less homophilic character of this sphere theoretically, but also with the recent local discussions on the sociology of religion. A similar kind of result is found for the work sphere, which contributes to more varied sociability and lower probabilities of the presence of high localism and of large neighborhood spheres. This is compatible with the previous and already published results of this research.

Finally and of special interest for this article are the results in terms of spatial variables. Both localism and segregation impact negatively the variability of sociability and the presence of middle networks with organizational sociability. Additionally, a high presence of individuals in the neighborhood sphere has positive impact on network size. This has important consequences for living conditions of segregated individuals, since these relational situations are associated systematically with better social conditions. So, the relational patterns which contribute to social integration tend to be systematically less frequent in segregated environments, as well as for individuals with very local networks, reducing the potential effect of integration through networks. This result presents an important social impact for poverty, contributing to its reproduction as well as to the durability of inequalities.

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1. Livre-docente professor at the Political Science Department, University of São Paulo, and researcher at the Center for Metropolitan Studies (CEM), ecmarq@uol.com.br. [↑](#footnote-ref-1)
2. An extreme empirical effort in this direction was made recently by Hipp et al (2012), who proposed a method to design neighborhood boundaries departing from personal networks. [↑](#footnote-ref-2)
3. São Paulo is the largest city in the country (and in South America) and Salvador is the sixth Brazilian metropolis in size and the most important city in the Northeastern region, the poorest of the country. In 2010, the population of São Paulo reached 19 million inhabitants, while Salvador housed 3.6 million persons. [↑](#footnote-ref-3)
4. The list included: Favelas - Jaguaré, Paraisópolis, Vila Nova Esperança, Guinle and Favela da Paz; Central tenements - Avenida do Estado and Pelourinho; Housing projects - Novos Alagados and Cidade Tiradentes; Mixed áreas - Jardim Ângela, Nordeste de Amaralina and Curuzu. [↑](#footnote-ref-4)
5. This effect appeared in an interaction term. [↑](#footnote-ref-5)
6. The following sites were considered segregated in São Paulo: Vila Nova Esperança, Cidade Tiradentes, Guinle, Jardim Ângela and in Salvador: Favela da Paz, Novos Alagados. [↑](#footnote-ref-6)
7. All reported results are significant at 95%, except when stated explicitly. In the case of segregation, the relationships were tested in tests of means, but in the case of localism I used correlation analysis. [↑](#footnote-ref-7)
8. This was measured by the E-I Index for the attribute ‘sphere’. [↑](#footnote-ref-8)
9. The Pearson correlation is 0.394, significant at 95%. [↑](#footnote-ref-9)
10. At 0.188, significant at 95%. [↑](#footnote-ref-10)
11. The simple # 2-clans also entered the model and, in fact, resulted in a better adjustment (adjusted R2 of 0.700). However, to remove a potential direct effect of network size on cluster formation, I ‘normalized’ the measure by dividing it by the number of nodes. [↑](#footnote-ref-11)
12. Measured by the E-I index for the attribute local/non-local node. [↑](#footnote-ref-12)
13. Again if we had included the # 2-clans directly, we would find a similar result and with a better adjustment – R2 of 0.351. [↑](#footnote-ref-13)
14. Since the average proportion of these two spheres is relatively the same (8 and 5%, respectively), this result cannot be attributed to the general composition of sociability. [↑](#footnote-ref-14)
15. This threshold corresponds to the 8th decile, in which the distribution suffers an inflexion. [↑](#footnote-ref-15)
16. This corresponds again to the 8th decile, where the distribution suffers an inflexion. [↑](#footnote-ref-16)