THE IMPACT OF THE INTERNET INTO THE PERCEPTION OF ISOLATION AND SOCIAL CAPITAL: ANALYSIS OF RURAL COUNTIES IN AYSÉN AND METROPOLITAN REGION.

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ABSTRACT

In a context of the Information and Knowledge Society (Webster, 1995; Bechman, 2012 in Kornienko, 2015), the digital divide is a problem that we should examine because of the inequalities that can occur. This research aims to analyse the digital gap regarding isolation as one of the variables that are affected by Internet access. Looking into rural, isolated locations in Chile, this research measures individual social capital through Social Network Analysis (SNA). The project seeks to update and complement information from a previous study done in 2011-2012 on the same topic. The research analyses the data set generated in this study to deepen into the baseline conducted previously. The main objective of this research is to measure social capital in isolated places and analyse the impact of Internet use into the perception of isolation. The methodology consists of the analysis of some questions of a regular questionnaire (623 cases) and a Social Network Analysis survey (20 ego networks). The data was collected face-to-face in 6 different counties of the Metropolitan Region and Aysén Region in 2011. Main results show that Internet access reduces the perception of isolation among this type of population.

Furthermore, the Social Network Analysis showed people who have higher levels of isolation present fewer components in their networks and age is not related to the density of the ego networks studied. Additionally, this is an important topic to explore because 'Digital Transformation' is one of the strategical objectives for the development, growth, and well-being in Chile currently (OECD, 2018). Rural and remote areas experience many inequities in this regard, and this research can be an example for other countries in Latin America, the OECD and worldwide.

KEYWORDS: Internet, Social Capital, Rural Isolated Counties, Multinomial Regression Model, Social Network Analysis, Patagonia.

WORD COUNT: 14,323.

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iv. The data set and ego network matrixes analysed in this dissertation were produced in 2011-2012 in Chile, by a project in which the author was part of the research team. That project had FONDECYT (National Fund for Scientific and Technological Development of Chile – in Spanish) sponsorship and funding. It was called '*El Impacto de Internet en el Capital Social de las Comunidades Aisladas. n. 1120866*' (The Impact of the Internet in Social Capital of Isolated Counties. n. 1120866). The research team was led by José Ignacio Porras, John Durston and Rubén Pino.

v. The original data set and surveys analysed in this dissertation were in Spanish; the author initially completed all translations for tables, graphs, and the literature review.

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Although they are not in this world anymore, I want to dedicate this dissertation to my two grandfathers: my grandfather Fernando Díaz, who I never met in person, because he was murdered during Pinochet's dictatorship in Chile and my recently deceased grandfather Jaime Careaga. He was an example of effort and ambition for the essential things in life.

ACRONYMS AND ABBREVIATIONS

i. **CADEM:** A private company in Chile that is dedicated to conducting cohort and panel studies with a qualitative and quantitative approach**.**
ii. **CASEN:** National Socioeconomic Characterization Survey.
iii. **CIA:** Central Intelligence Agency (US government).
iv. **CIDEZE:** Interministerial Committee for the Development of Extreme and Special Areas in Chile.
v. **CONICYT:** National Commission for Science and Technology Research.
vi. **FONDECYT:** National Fund for Scientific and Technological Development (Chilean government).
vii. **ICT:** Information and Communication Technologies.
viii. **OECD:** Organization for Economic Co-operation and Development.
ix. **PNUD:** United Nations Development Programme.
x. **SUBDERE:** The Undersecretary for Regional and Administrative Development.
xi. **SUBTEL:** The Undersecretary of Telecommunications, an organisation that depends on the Ministry of Transport and Telecommunications.

1. Introduction

Presentation

In a context of Information and Knowledge Society (Webster, 1995; Bechman, 2012 in Kornienko, 2015), the digital divide is a problem that we should examine because of the inequalities that can result. This research aims to analyse the digital gap regarding isolation as one of the variables that affect access to the Internet in rural locations in Chile.

This Presidential Republic, located in western South America, is a thin strip of land between the Andes mountain range and the Pacific Ocean. Its area covers 756,096 square kilometres, and its present population exceeds 17.5 million inhabitants, with 51.1% of the population female (CENSO, 2017). The largest city and the capital is Santiago, and the national language is Spanish.

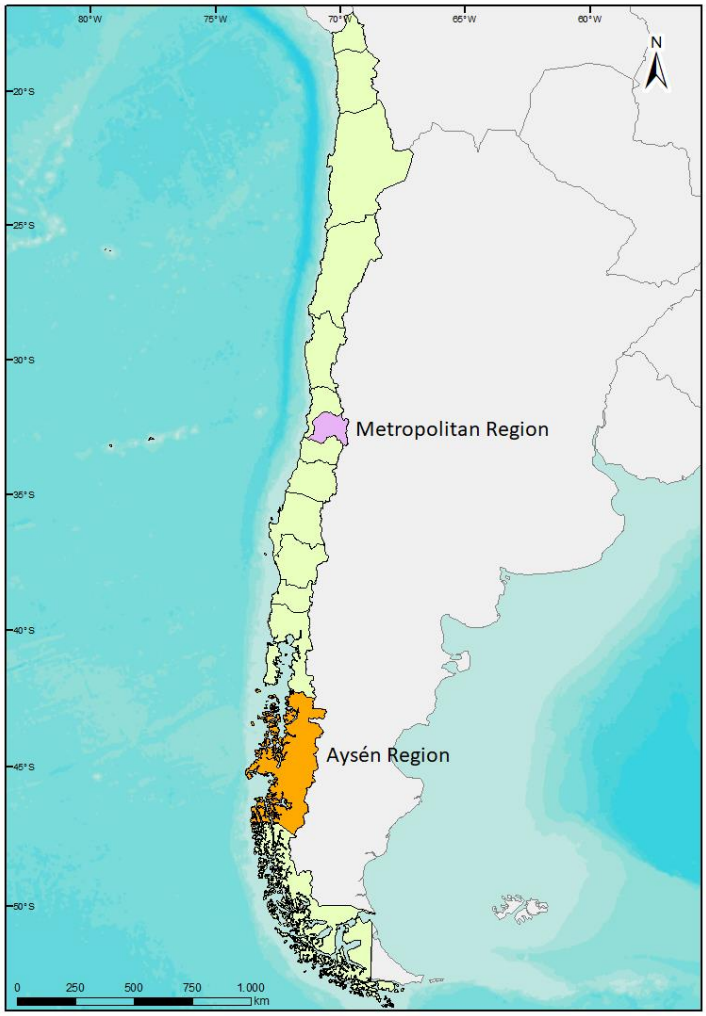
Map 1. Chile in South America.

Source: Own Elaboration using ESRI 2020

Chile has an economy characterised by the exploitation and export of raw materials, a nation that is market-oriented and characterised by a high level of foreign trade. Services and exports of goods account for approximately one-third of GDP, with commodities making up some 60% of total exports. Copper is Chile's top export and provides 20% of government revenue, where fruit, fish products, paper and cellulose pulp, chemicals and wine are other important exports. (CIA, 2011).

This study analyses six Chilean rural counties regarding the use of the Internet in 2012. At that time, the rural population of the country was 12.81% (World Bank, 2020). This study will focus on the most rural, isolated counties in the central Metropolitan Region (Región Metropolitana), and counties of very high isolation in the extreme southern Aysén Region (Región de Aysén).

Map 2. Metropolitan and Aysén regions.



Source: Own Elaboration using ESRI 2020

We cannot talk about Internet access or its impact on society without considering the problem of the digital divide. This problem is a predominantly quantitative gap in access to ICT's, or even as a much broader and deeper problem of exclusion and relative poverty with all their manifestations. This access to telecommunications infrastructures and particularly the Internet is perceived as essential to participate in the Information Society (Molina, 2003).[1]

[1] According to OECD (2001), the term refers to 'a gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access ICTs and to their use of the Internet for a wide variety of activities' (p. 4).

Internet access in Chile is high in comparison to other countries of Latin America. Nevertheless, the study of the adoption of ICT in this country represents a paradox: While it is one of the countries with the highest levels of connectivity in Latin America the urban-rural gap has widened (Correa & Pavez, 2016). The last measurement showed that the Internet penetration in this country is 87,4%, but there are some differences among access in urban homes (89.1%) and rural areas (76.7%) (SUBTEL, 2017 in Correa & Pavez, 2016). Different authors have shown that as Internet access expands, the urban-rural digital divide continues to be strong in both developed and developing countries (e.g. LaRose, Strover, Gregg,&Straubhaar, 2011 in Correa & Pavez, 2016). Likewise, isolated rural communities face specific contextual challenges that we need to consider, including a lack of economic resources, geographic isolation, and population migration (Correa & Pavez, 2016).

In 2012, 51.8% of the households had computer access in Chile, and 52.2% of the population had access to the Internet. Particularly in the studied regions, 42.1% of homes in the Aysén region and 49.2% of homes in the Metropolitan region had internet access. Both of those areas have better levels than the country (40.9%). In Chile, for the studied year, there were 49.8% of the population that did not have Internet access because it was too expensive. (CASEN, 2011).

This study contemplates rural, isolated counties in the already named regions. The isolated counties in this study, defined by an index from the Interministerial Committee for the Development of Extreme and Special Zones (CIDEZE), showed high and very high levels of isolation. Isolated counties are those territories that gather a large part of the following elements: critical isolations, scarce and highly dispersed population, deficit presence of public services and low level of socioeconomic development (SUBDERE, 2008).

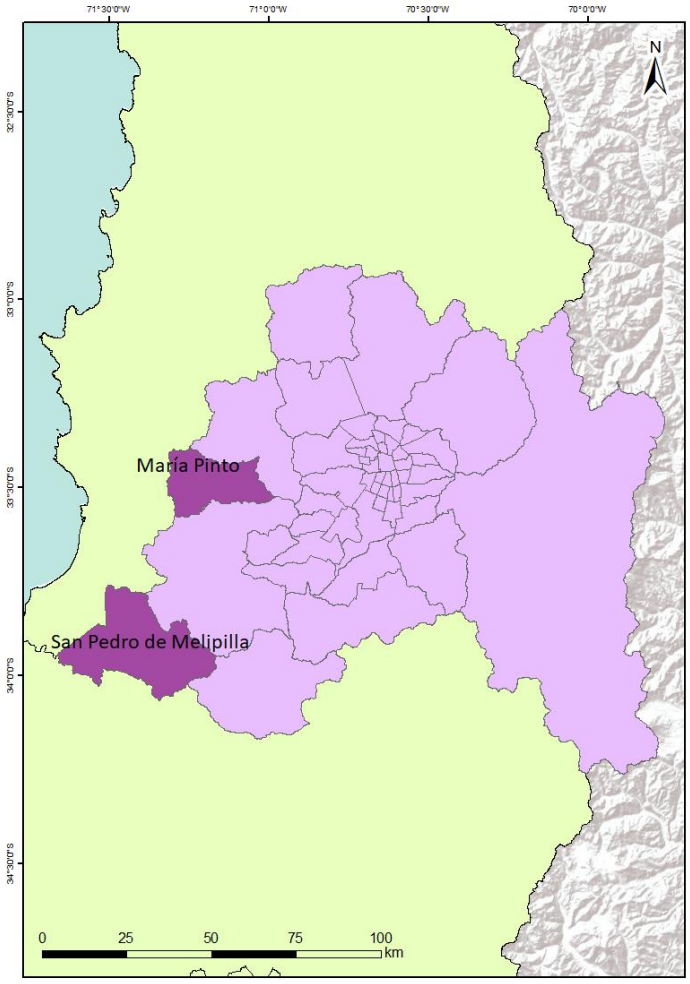
The Metropolitan Region is the most populated in the country, with more than 7 million inhabitants and a general population density of 461.77 inhab/km² (CENSO, 2017). This region is in the central territory of Chile, and it has significant political and economic importance. It is compound by urban and rural counties. This study considered the two most isolated and rural counties of the area, which I describe in the following table.

Table 1. Description of counties from Metropolitan Region

County	Population (2017)	Population Density per km²	Principal Economic Activities
María Pinto	13,590	26.18 (inhab/km²)	Horticulture and animal husbandry
San Pedro de Melipilla	9,726	12.35 (inhab/km²)	Agriculture in cereals and fruit trees

Source: Own elaboration using CENSO, 2017 and CIA, 2011.

Map 3. Counties from Metropolitan Region



Source: Own Elaboration using ESRI 2020

The Aysén Region is located in the extreme south of Chile in an area known as Patagonia. Its population is 91,492 inhabitants, which is the least populated region of the country. This number is equivalent to 0.6% of the national population, and its density reaches 0.8 inhab/

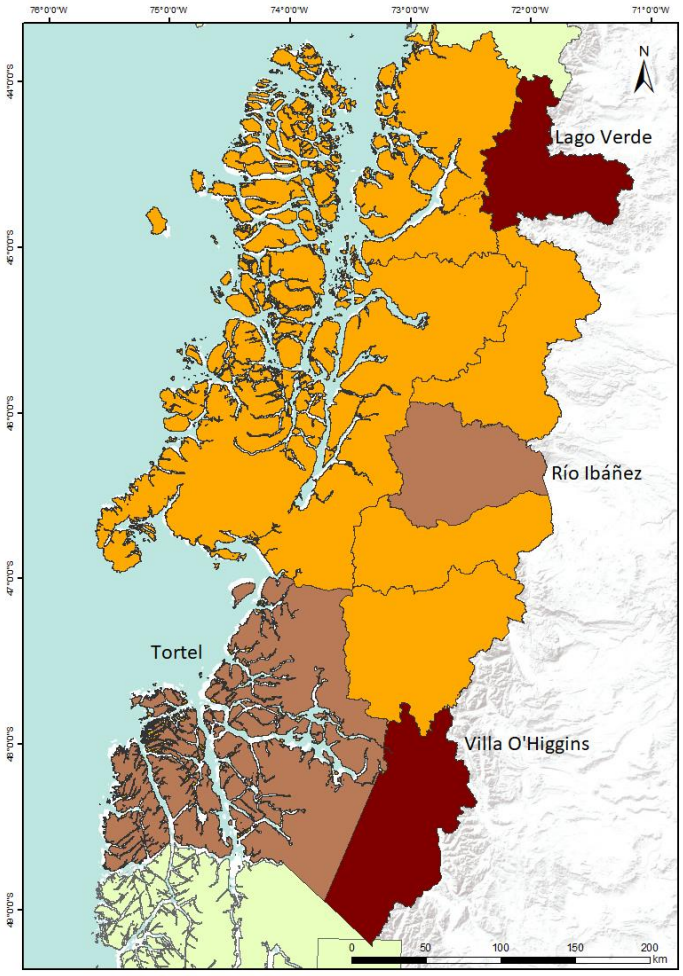
km²(SUBDERE, 2020). This study considers four counties in the Aysén region described in the following table:

Table 2. Description of counties from Aysén Region

County	Population (2017)	Population Density per km²	Principal Economic Activities
Lago Verde	852	0.15 inhab(/km²)	Animal husbandry
Río Ibáñez	2666	0.44 inhab(/km²)	Commerce and tourism
Tortel	623	0.027 inhab(/km²)	Generation, Capture and Distribution of Electric Power and tourism
Villa O'Higgins	625	0.1 inhab(/km²)	Animal husbandry, forestry and tourism

Source: Own elaboration using CENSO, 2017 and CIA, 2011.

Map 4. Counties from Aysén Region.



Source: Own Elaboration using ESRI 2020.

Baseline and other backgrounds

The baseline of this research is a FONDECYT project sponsored by the government of Chile in 2011-2012. The name of this study was "The Impact of the Internet on the Social Capital of Isolated Counties"[2], and it considered the locations presented previously. The main objective of this research was to determine the impact of the Internet in the construction and strengthening of individual and collective social capital of people who live in counties with high levels of isolation. As a result, the research showed that:

(i)The Internet affects patterns of the relationship of people from isolated counties by expanding and diversifying their social relationships socially and geographically.

(ii) The Internet is constituted in a space that, in a complementary way, strengthens weak ties from the generation of interpersonal trust given in (presential) face-to-face relationships. The social use of the Internet becomes more selective the more isolated the county is.

(iii) The Social Capital of individual character, built through the Internet, tends to be transferred to the level community giving rise to the emergence of new actors with intermediation roles, who complement traditional brokers.

Other studies had evidence that rural areas have higher levels of poverty, show lower levels of education (Rambla, 2006), and suffer resettlement of their young population (PNUD, 2008).

According to research, Internet connectivity in these areas would be beneficial. It would help to overcome geographic isolation, (to) promote access to resources and opportunities, and (to) encourage social interactions and community attachment which would lower the possibilities of out-migration and stimulate economic development (Whitacre, Gallardo & Strover, 2014 in Hofferth & Iceland, 1998). Nevertheless, evidence suggests that the availability of financial resources and technological infrastructure are the first step towards completing a digital inclusion process. Consequently, it is necessary to account for factors as

[2] The gathering of information was made by the Project FONDECYT n. 1120866 '*El Impacto de Internet en el Capital Social de las Comunidades Aisladas*'

motivations, needs as well as the social and cultural context (Mehra, Merkel, & Bishop, 2004; van Dijk, 2005).

Following Pino (2013), the use of the Internet as a tool becomes a force that prevents the dissolution of social ties as a product of geographical distance. This use serves as a space that can transcend the virtual relationships that coexist with the traditional patterns of initiation and development of social relationships (p.16).

The research aims to analyse the digital gap regarding isolation as one of the variables that affects access to the Internet, looking into rural, isolated locations in Chile. I want to measure the impact of Internet use on individual social capital and the perception of isolation. The research seeks to complement information from the previous study done in 2011-2012 on the same topic, presented as a baseline[3]. Regarding this information, it is crucial to explore this issue because 'Digital Transformation' is one of the strategical objectives for the development, growth, and well-being in Chile at this time (OECD, 2018). Rural and remote areas experience many inequities in this regard, and this research can be an example for other countries in Latin America, the OECD and worldwide.

As you can see, this thesis followed different areas or edges that compose the problem. In the first place, is the issue of the digital divide and the inequalities that produce in population in general. Second, there is social capital as a concept measured through Social Network Analysis (henceforth SNA) and a face-to-face Questionnaire. Thirdly, the issue of connectivity and isolation in rural areas appears, which for this case is highly important. I will focus on the reality of Chile considering the most rural, isolated counties in the central Metropolitan Region (Región Metropolitana), and counties of critical isolation in the extreme southern region of Aysén (Región de Aysén).

Research Questions

This thesis presents two types of further analysis, which is why I divided some sections into two parts. Part A corresponds to the evaluation of a questionnaire applied to 623 Internet users corresponding to the counties described previously. Part B is an analysis of twenty social networks of Internet users who lived in three of the six counties in the sample.

[3] In that project I was part of the research team and participated as an interviewer and coordinator for one year.

Consequently, there are two general questions and two specific questions that guide this research:

Research Question A. Does Internet access affect the perception of isolation of rural inhabitants of isolated counties of Chile?

Research Question A.1. Do sociodemographic dimensions (age, gender, level of isolation and level of studies) affect on the perception of isolation when having Internet access in rural counties of Chile?

Research Question B. How can we characterise social capital among a rural, isolated population of Chile through social network analysis?

Research Question B.1. Do sociodemographic dimensions (age, level of isolation) have any influence on the characteristics of the networks in an isolated rural population of Chile?

According to the presented questions, I suggest the hypotheses following the same order. The hypotheses for part A are the following:

Hypothesis A. Internet access affects the perception of isolation, making rural users feel more connected.

Hypothesis A.1. Access to the Internet affects the perception of isolation of rural users who live in isolated counties of Chile. Sociodemographic variables have an impact on this effect.

Continuing with the presentation of the hypotheses, I present those corresponding to part B. There is one hypothesis for research question B, and two hypotheses related to research question B.1:

Hypothesis B. Ego networks of isolated rural users are dense and oriented mainly to close ties. Given the level of isolation, these people have network structures made up of a few nodes and components.

Hypothesis B.1.1. Ego networks users living in isolated sectors show differences according to age ranges. In this way, the oldest inhabitants present networks with fewer nodes and a higher total density.

Hypothesis B.1.2. Social networks of rural users differ according to their level of isolation. Those people that have ego networks with a high level of isolation (Metropolitan Region) present greater disarticulation than the ones of people in very high isolation (Aysén Region).

This document has five parts in its structure. Firstly, there is Section 1 that is the introduction. The second section reviews the literature and sets out the theoretical framework for further analysis. Section 3 describes the data and the methodological approach. Section 4 presents the results; descriptive and causal effect model results are in this section. Finally, Section 5 are conclusions and findings.

2. Literature Review

Internet and Social Capital

Internet penetration and the rest of the Information and Communication Technologies (ICTs) force us to rethink aspects of community identity. Classic authors, as Tönnies (1887) and Durkheim (1893), linked the definition of community to the idea of living together in a specific geographic area. The reflection on the social transformations brought by new technologies results in a new conception of community development, which emphasises the construction of social networks that transcend the territorial framework. Therefore, community can also develop through ICTs and seems to stop being only a consequence of the social relations that take place in a particular territory.

Scholars interested in the social impact of the Internet have been studying the relationship between social capital and Internet usage as a relevant research area (Neves, 2013). Daniel Bell (1977 in Di Maggio et al. 2001) seems to be the first sociologist to write about the social impact of digital communications media. He predicted the democratisation of electronic mail, as well as the digital transmission of newspapers and magazines. Bell explored the policy dilemmas these changes would raise, referring to the new communications technology as the central issue of the post-industrial society (1977:38). In more recent years, Manuel Castells (1996) claimed that we are entering an "information age" in which digital information technology provides the material basis for what he calls "the networking form of organisation" in every realm of social structure (p.468).

Research across the globe linking social capital and the Internet has proliferated in recent years, especially considering the rise of applications such as Facebook and Twitter (Pino, 2013). Some studies conclude that the use of the Internet isolates individuals (Putnam, 1995). On the contrary, there is also strong evidence that its use can strengthen ties or create new connections (see Kraut et al. 2002; Lin, 1999; Pénard and Poussing, 2010).

Social capital is a complex concept with various definitions in which components are approached from multiple perspectives throughout history but with one core idea: social ties matter and bring benefits. These benefits are related to resources that we can draw from our social links (i.e. from our social networks). These resources include social and

economic resources, such as social and emotional support or financial help (Neves & Fonseca, 2014).

Alternatively, we can talk about social capital from the perspective of different authors that focus on either external factor, internal ones or both. Bourdieu (1986), for example, considers social capital as aggregated resources linked to a durable network of mutual relationships. Knoke (1999) ponders the mobilisation and creation of connections of an actor to gain resources as a process. Boxman et al. (1991) also regard the number of people that provide support as a network. On internal aspects, Fukuyama (2001) highlights social capital, considering the existence of a shared set of informal values or norms that permits cooperation within a group. Putnam (1995) adds the idea of networks, standards, and social trust as features of social organisation that facilitate collaboration and coordination. Finally, some perspectives consider the external and internal aspects. For example, Woolcock (1998) emphasises information, trust and norms of reciprocity that are part of a social network. We can divide social capital in individual and community social capital.

On one hand, Individual social capital is a dimension of social capital that includes the support networks (e.g. for economic, health and work problems). It deepens and consists of the location of those support networks. This type of social capital refers to the personal support network and how a person can move resources inside that social network (Coleman, 1988).

On the other, community social capital considers participation in different types of organisations (such as neighbourhood committee; sports club; religious organisation; Union; Social Movement; etc.). This type of social capital refers to the cohesion of the community, and collaboration among different entities inside of it (Durston, 1999; 2003).

The impact of the Internet on social capital is still a field that has not reached a definite conclusion. Various scholars believe that the Internet facilitates the creation of social capital by making the flow of information more efficient (Lin, 2001; Wellman, 2001). Yet others, report that Internet users are no different than non-users on measures of civic engagement (Putnam, 2000).

There are various approaches to so-called virtual communities and about the impact of the Internet on social capital. Some authors characterise them as casual, unreliable, sporadic

relationships and on many occasions, based on simulated identities that can hardly reach a lasting character (McLaughlin et al., 1995). On the other hand, authors such as Wellman (1999; 2002) or Castells (2001) agree in stating that it is instead a tool to complement existing social capital. In this way, the way people relate to each other in physical space and virtual space tends to converge. The focus of attention, therefore, should not only stay in the access to this technology but its use. According to Wellman et al. (2002), when the Internet is used basically for "asocial" activities or that involve any interaction with other people, this technology tends to promote individual isolation. On the contrary, when people use the Internet to communicate and coordinate with friends, family, and organisations - near or far away, it becomes a tool to build stable social networks over time.

Social Capital and the Internet in Rural Contexts

Traditionally, rural, and urban areas have been defined according to demographic and economic criteria that attempt to segregate the territory into one category or another. From Wilkinson (1991:55 in Hofferth & Iceland, 1998), we can define a rural area by three principal elements. The word "rural" derives from the Latin root "rus" which means open space. Therefore, the first element and most crucial element is the dispersion of a few people over a large territory. In the second place, we find some occupational patterns, such as farming, forestry, and extractive industries. The third and final element is a traditional lifestyle oriented toward the utilisation of local resources and self-sufficiency (Hofferth & Iceland, 1998).

In Chile, the official government definition is quite strict. Urban is defined as any group of concentrated dwellings, with more than 2,000 inhabitants, or between 1,001 and 2,000 inhabitants when 50% or more of the economically active population works on secondary or tertiary activities. Consequently, we can define as rural everything that is not urban (Berdegué et al., 2010).

The isolated territories in Chile have been described from the county as a territorial unit. There are five criteria to determine these territories: physical, demographic, economic, access to services and proximity to political-administrative poles. Thus, these territories are "*those that gather a large part of the following elements: critical isolation, scarce and highly*

dispersed population, deficient presence of Civil Service and low level of socioeconomic development" (SUBDERE, 2008:5).

Regarding the impact of the Internet on social capital, it is relevant to put this analysis into context. Isolated localities are a privileged object of study in the concern to reveal the impact of the Internet in the reconfiguration of social capital and the construction of community (Pino, 2020). Proenza et al., referring to Internet users in rural areas, point out that these are different to urban users by aspects associated with income or knowledge about using computers (2001). For example, the perception of time is different in both contexts. Suppose time is perceived more slowly in rural areas, without much haste. In that case, we expect that the need to establish ties instantly (Bauman, 2005) will not be experienced with the same intensity in rural areas as in urban contexts (Cárcamo and Cladellas, 2009 in Pino, 2013).

According to social relationships, Hofferth & Iceland (1998) argue that traditional rural societies are generally inserted in networks of close personal ties that govern every aspect of an individual's life. Because intimate relationships perpetuate the class structure, these strong relations, even though they are supportive, may limit mobility (p.577-578). Wilkinson (1991) argues that rural residents have more strong than weak ties. Other authors claim that rural environment has some conditions that increase the need for intra-family cooperation and exchange. Some of these conditions are isolation, lack of public transportation, challenging weather conditions, the heavy seasonal demands of farming, and the lesser availability of public services (Coward and Rathbone-McCuan 1985; Lee et al. 1994 in Hofferth & Iceland, 1998).

In their study, Hofferth & Iceland (ibid) conclude that families living in rural areas are more likely to relate exclusively with kin than families living in urban areas. Families living in rural areas are more likely to receive monetary support from kin than families in urban areas.

With a more specific scope, studies in Chile show that young people increase their weak links by meeting users in virtual space, that they eventually meet in person. People over 30 tend to maintain and reinforce existing contacts, mainly with family and friends (Pino, 2013). The regular access and use of this communicational resource modify patterns of the relationship of people who live in isolated areas, increasing the number of links and their

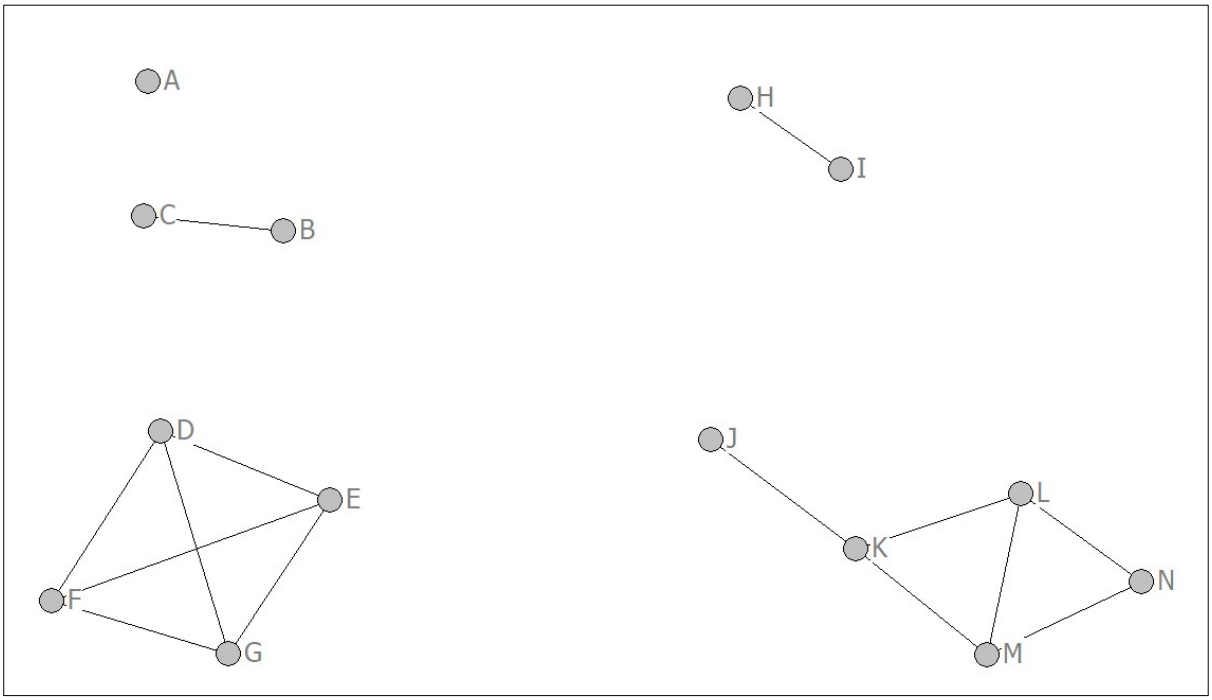
diversity. This situation expands their opportunities for access and mobilisation of resources (ibid).

Social Network Analysis and Social Capital

Social Network Analysis (henceforth SNA) is a formal study of the relationships between two or more actors and structures social that arise from the recurrence of these relationships. (Wellman, 2001). This perspective comprehends relations as a system were attention is foremost on the connections. The focus is first on the relationships between individuals, and secondly on characteristics of each node.

The node is an actor or entity that makes up the network and is also known as a vertex, point or agent (Borgatti et al., 2013). Each node may be related to other actors by a link, which is represented by a line (also known as edge or tie) (ibid). In figure 1, circles represent actors from a rural, isolated county. In the example, A is an actor that has no relation with other agents, while a link connects b and C.

Figure 1. Parts of a Ego Network



Source: Own elaboration using UCINET

*This is one of the cases analysed in the thesis. It corresponds to net 17 (Germán).

These nodes have characteristics called attributes, which distinguish them. Colours or shapes might represent a node-level attribute, such as their gender or age. The relationship between nodes may also have features of the type and direction of the link (Borgatti et al., 2013). The relationships studied often represent communication, influence, or trust (e.g. friendship), but can also refer to conflict (e.g. disputes). Most social network studies also include attribute data describing the nodes, the relationships, or both. (O'Malley & Mardsen, 2008:3)

The basic unit of SNA is, therefore, the relational data or specific link between a couple of elements (Chung et al., 2005). Consequently, network science rests on the theoretical claim that outcomes are affected by structure, meaning that there is dependence among individuals (Robins, 2015). The relational data existing between a certain number of nodes arise from communication, collaboration, transaction, or valuation. The actors or nodes can be organisations or individuals, collective or individual, human, or artificial. (O'Malley & Mardsen, 2008)

The notion of a path is a crucial concept in graph theory. In the friendship network in figure 1, vertices J and M do not have a tie, but information passed along between friends could reach M from J through the intermediary K (Borgatti et al., 2013: 16). When we understand the concept of "path" is easy to understand the concept of "component". A component is a maximal set of nodes in which every node can reach every other by some path (Borgatti et al., 2013:335). In the previous example, there are five components, note that node A is a component by his own because it is alone.

The idea of cohesion in a network is connectedness. Borgatti (2013) explains it nicely with the Spanish word *enredado*. This word means tangled up, like a big clump of electrical wires. It is particularly appropriate because it is based on the word *red* that means network (p.174).

It is possible to measure the cohesion of the network in different ways. Perhaps the simplest way to do it is through density. Density is the number of ties in the system, expressed as a proportion of the total number possible. We can interpret density as the probability that a link exists between any pair of randomly chosen nodes; nonetheless, the absolute number can be hard to assess whether a density should be considered high or low. That is the

reason why the comparison should look at the context. The advantage of density over measuring the simple number of ties is that it adjusts for the number of nodes in the network. Thus, density may compare across groups of different sizes (Borgatti et al. 2013: 174-5).

In general, SNA is usually either conducted using the socio-centric approach or the ego-centric approach. An ego network consists of an actor, the other actors in its immediate locality or neighbourhood, and the relationships among them. (Chung et al., 2005). The ego-centric approach is the study of the network relations surrounding individuals, instead of focusing on the whole society or community. Hence, its concern is making generalisations about features of personal networks concentrate on the individuals. It is essential to say that ego (the "protagonist" of the ego network) does not appear in the figure because it is connected with everyone in the net.

By offering analytical tools to measure and model relational patterns, SNA is a practical method for studying social phenomena (Bellotti, 2015). Nevertheless, this analysis has characteristics that make it very contextual; thus, is not generalisable as a method that looks upon associations and dependencies (Snijders and Bosker 2012 in Bellotti, 2015).

Network theory has a particular approach to social capital, even though the literature on the topic goes beyond networks. Lin (1999) defined social capital as embedded in a social structure accessed or mobilised by the actors with a purpose. Specifically, a social network may provide individuals with a capacity for social action or personal advantage that would not be available in the absence of a social system, namely, social capital (Robins, 2015).

Burt's (1992) theory of structural holes exemplifies another point of view of social capital inside networks according to the local structural position. A brokerage[4] position is taken as social capital because there are benefits to be reaped from occupying the position. Coleman (1988), in contrast, considered that closed structures indicated positive social capital because they enable more social support from closed partners.

[4] The function associated with having structural holes. A broker can bring value to an alter A by passing along something learned from alter B. This is enabled by the lack of direct tie between A and B. (Borgatti, 2013. p.332)

In this sense, we can interpret the network as a form of social capital for the actors within it. When we find closed structures, actors may benefit from strong support (bonding capital), but in structural holes, actors may gain brokerage advantages (bridging capital). When actors have access to various social resources or know others in a wide variety of social positions, social capital may also be present (Robins, 2015).

Finally, the attractive aspect of network analysis is that reversing the traditional logic of the survey in sociology; it considers that the social categories (e.g. classes, races) and the delimited collectives can be more adequately highlighted by examining the relationship between social actors. The analysis starts from a set of relations, which can build the plans and typologies of social structures, instead of beginning with an a priori classification of the observable world (O'Malley & Mardsen, 2008).

3. Methodology

Research design

The research aimed to explore the intersection of social capital, Internet access and isolation in rural users. For this purpose, the research questions were divided into two different parts. Part A of the study has the objective to analyse if Internet access affects the perception of isolation in rural inhabitants of isolated counties of Chile. Part B of the thesis seeks to characterise social capital among a rural, isolated population of Chile through social network analysis.

This mixed-method research was a non-experimental explorative study that sought to expand on the baseline study that involved a survey and a personal-network research design. The techniques included a questionnaire, a social network survey and ethnography.

The research team applied the questionnaire to the population under study in hard copy during fieldworks in 2011 and 2012. The sample belonged to six different isolated counties in Chile. It is essential to highlight that given the topic, the respondents were very difficult to reach given the high levels of isolation of the localities where the team did the fieldwork. There aren't digital copies of the original questionnaire.[5]

Social network analysis was conducted by interviewing another group of people from three out of those six counties. The information-collecting instrument consisted of a hard copy of three pages. The first one was a background sheet, the second one a list of contacts with attributes and the last one was a relation adjacency matrix of those contacts.

Three sources provided qualitative information from ethnographic contextualisation. The first source was the background. Also, fieldwork was performed by the author in 2011. Thirdly the author did two interviews with one of the research experts from the baseline study. Regarding the background sheet, it is relevant to highlight that not all of them were the same. So, some information was missing, and other categories did not match.

Nevertheless, the issue was exciting; the data set adjusted to the topic and the target population—the data resulted in an interesting mixed analysis (statistics analysis and social network analysis).

[5] Just the data set organized and coded in SPSS.

It is also essential to add that I was part of the research for one year as a coordinator of the project and interviewer. Consequently, there are lots of comments and observations that are related to my experience.

Variables of the study

The baseline study provided some constructs that were chosen to be the principal dimensions of the analysis. The following variables identified the underlying dimensions, which are the central ideas that structured the questionnaire (Pino, 2020). Since the research was divided into two different parts, there are two separate dependent variables.

The usefulness of Internet access affecting the perception of isolation was defined as the dependent variables in part A; this variable is called the **perception of isolation**. The multiple-choice question that measured the perception of isolation was the following: *"Regarding the Internet and your situation of isolation; you would say that the Internet helps you reduce your feeling of isolation…(not at all, a little bit, moderately, a lot or completely)*. Isolation was measured as an explanatory dimension according to an index as well.

Individual social capital was measured by social networks (ego networks) from respondents. Part B had **social capital** as the explained variable. Other studies in isolated areas in Chile have demonstrated that Internet access changed social capital, experiencing an increase of links in the network in both new and existing relationships (Pino, 2013; SUBTEL-ARSChile, 2006). In this research, I understood the alters as those people in the social network to whom ego (respondent) usually established communication and shared a relationship. This type of social capital refers to the personal support network and how a person can move resources inside that social network.

Regarding the topic, we explored **Internet use** as well. This dimension included the place of connection, frequency of use and purposes like the use of the Internet to perform administrative tasks (paying bills, bank payments, filling forms, etc.).

The exposure variables were sociodemographic dimensions, the **level of isolation**, **age**, **gender** and **level of studies**. The level of isolation was calculated based on an index defined

by the CIDEZE[6] committee. It is crucial to consider that most of the isolated areas in Chile did not have Internet access in 2012. Hence, the places considered in this study were locations that had a high level of their population under isolated circumstances (25% or more), there are more isolated locations in Chile. Still, they do not have Internet access (SUBDERE, 2008).

Age was measured in two groups for part A and as a scale in part B. For part A, age was used in group categories because of the were too many missing values on the data set. Young respondents were divided at the age of 29 years because the INJUV defines that the group of young people ends at that age (Pino, 2020). The distribution of age groups was dissimilar because of sampling difficulties and the target population. There were not too many respondents that were Internet users older than 50 years old (ibid).

Gender variable had some missing values that could be filled, looking at the data. The data collection provided by the researcher in charge of the baseline study had the names of the respondents. In Spanish, usually has denominations that are gender-oriented; consequently, some of the missing values of this variable were able to be determined.

In the original questionnaire, we asked about the level of studies with ten possible category answers. By the expert´s advice, this question was recoded into five categories (Pino, 2020). The translations are not very similar to the originals because of the particularities in the Chilean education system; they were adapted to the English educational system.

The socioeconomic level and occupation of the respondents were measured in the original survey, but not included in this research under the expert's advice. The variable associated with income level had many missing values because people did not want to declare this information, or some young respondents didn't have the information. The occupation was a variable that was discarded as well, after a multicollinearity test. It was similar to the educational level, and there were many categories with low response rates.

[6] More details on how this index was constructed can be found in the literature review.

Data

The researchers designed the sample of the baseline study as a simple random sample that compared highly isolated counties from very highly isolated ones. The justification for this sample design was associated with the search for a comparison between rural counties close to a large metropolis (Santiago) and others far away from central urban poles of the country (Pino, 2020).

Nevertheless, due to extreme isolation of the rural locations that the team visited in fieldwork, the strategy to collect respondents worked as a snowball because they were too difficult to find. The sampling strategy for part A was similar to the one used in part B involving seeking people in public places, public services, local libraries and high-schools. Contact with local libraries was crucial because they have Internet access thanks to a government program called "*Biblioredes*" (Pino, 2020).

Sample A consisted of 623 cases; 128 cases were in high isolation (20.5%) and 495 in very high isolation (79.5%). The respondents in high isolation belong to the counties of *María Pinto* and *San Pedro de Melipilla*. The ones in very highly isolated counties belonged to *Villa Cerro Castillo, Tortel, Río Ibáñez* and *Lago Verde*.

There was a significant amount of missing values in the outcome variable from sample A. Despite this and considering the pertinence of the question regarding the research topic, it was decided to use the variable anyway. The variable from part A had 164 missing values out of 623. After analysing the data and crossing related dimensions, it was determined that those missing values were mainly related to people that did not feel any isolation. In fact, it corresponded to 148 out of the 164 missing values. This information was examined by crossing the dependent variable A with a battery of the multiple response questions that asked if the respondent felt isolated in some respects. This question had an answer choice which was "*I don't feel isolated in any aspect*."

Once I made sure that a large number of missing values of the dependent variable were associated with the lack of isolation perception, I recoded the variable adding the missing cases of the crossing filtered as a non-isolated category. In table 2, the variable names, the original categories and the recodification can be seen. Some recodifications of the independent variables were also conducted. In table 3, the name of the variables, the

translation of the original question, the answer categories and the recodification of them can be found.

Table 3. Recodification of the dependent variable part A.

	Variable name	**Original answer categories**	**Recoded categories**
Model 1	Internet_percep_isol.1	1= Completely 2= A lot 3= Moderately 4= A little bit 5= Not at all	0= Nothing or a little bit 1= Moderately 2= A lot or completely
Model 2	Internet_percep_isol.2	1= Completely 2= A lot 3= Moderately 4= A little bit 5= Not at all	0= Non-isolated 1= Nothing or a little bit 2= Moderately 3= A lot or completely

Source: Own elaboration.

Table 4. Recodification of the explanatory variables.

	Variable name	Original question*	Original answer categories	Recoded categories
1	Gender	Sex	0= Woman 1= Man	0= Female 1= Male
2	Age	Age	1= Below 15 years old 2= Between 15 and 29 years old 3= Between 30 and 50 years old 4= Over 50 years old	0= Between 15 and 29 years old 1= Older than 30 years old
3	Isolation	Level of Isolation**	1= High 2= Critical	0= Very High 1= High
4	Level of Studies	What is your level of studies?	1= No education 2= Incomplete primary education 3= Complete primary education 4= Incomplete secondary education 5= Complete secondary education 6= Incomplete higher technician education 7= Complete higher technician education 8= Incomplete university higher education 9= Complete university higher education 10= Postgraduate	1= Primary education (0 to 8 years of studies) 2= Secondary education (9 to 12 years of studies) 3= Technician higher education (13 or more years of studies) 4= University higher education (13 or more years of studies)

Source: Own elaboration

*The original questions are presented in English; the Spanish version of the items is provided in the appendix.

** This question was filled by the research team following the classification of the index; the respondents did not answer it.

Sample B consisted of twenty cases (eleven female and nine male). Out of those cases, seven were at a high level of isolation (Metropolitan Region) and thirteen very high (Aysén Region). It is essential to highlight that the information-collecting instrument had some inconsistencies. The first one was that the background sheet was not the same for all the ego networks. The second was that the attributes contact-lists were dissimilar in many cases. Finally, there was a lot of missing information. That is the reason why some incomplete ego networks were left out.

Analysis

The analysis of part A was separate from the one of part B. Each one of them presented different samples, dependent variables, and methodologies. Each part had to use different software's as well. Part A corresponded to the comparison of two multinomial regression

models based on two different samples, where one was a subsample of the other. Part B was a comparison of ego networks. Part A and B were not nested models, but comparisons of different edges of the situation of Internet users living in isolation.

Several stages of revision were needed to arrive at the final proposal of the model. Since the data had so many missing values, I had to try different types of analysis and discard some types of models. In chronological order, and after analysing some descriptive statistics and certain crossovers, I performed exploratory factor analysis, then ordinal logistic regressions, and finally a multinomial regression model.

The exploratory factor analysis sought to identify underlying dimensions associated with the use of the Internet to see its influence on the perception of isolation. The initial idea was to extract factors to make a nested model and then evaluate the impact of those factors in a regression. Using two sets of questions, I explored the possibility of a relationship between the types of uses that respondents declared was considered. However, this analysis was discarded due to many missing values in these question sets.

After discarding the exploratory factor analysis, an ordinal regression model was carried out, given that the dependent variable was asked as a Likert scale in the original questionnaire. It would not have been desirable to dichotomise the variable because of its distribution since the category “moderately” was very significant. This model also did not work because it did not meet the proportional odds assumption.

Finally, a multinomial regression model was used. The result of this was the analysis of a sensitivity test comparing a model with missing values with a model that included the category of non-isolation. The entire process was done using SPSS 25.

The multinomial regression model compared model 1 (with the 164 missing values) to model 2 (including the category of 148 non-isolated individuals). This comparison used some statistics and the parameter estimates. Effect sizes were analysed using pseudo R-square. The measure of the amount of unexplained variability was in the data was given by log-likelihood test. Chi-square analysis was used to test the decrease in unexplained variance

from baseline models 1 and 2. The deviance predicted whether values from the model differ significantly from the observed values. Deviance was the chosen test for checking the goodness of fit of the model (Field, 2013).

Part B was a little bit different. The ego networks were analysed using UCINET 6.691, and then some tables with qualitative and quantitative information were built. The quantitative data were processed in R 3.5.3 using RStudio. With that software, some “ggplots” were created to compare the networks. No further statistical analysis was possible because there were only 20 networks.

The research had a lot of limitations due to the characteristics of the data collection and topic. There were missing values, some typing mistakes, and the questions had to be translated from Spanish. There were no digital copies of the questionnaire; consequently, the author could not analyse in detail the order of the items or that they were asked. Due to the extremely high levels of isolation, there were no chances to go back to the locations to fill the missing information. Trips were expensive and difficult because of geographical isolation (Pino, 2020).

Nevertheless, there were some advantages. The data was interesting and was precisely on the topic the author was looking. First, the researcher had direct access to talk to Rubén Pino, who was part of the research team from the baseline study. He explained the process and helped contextualise the problems. Also, the data set had almost all the names of the respondents. For social network analysis, the names were substituted by pseudonyms to protect the identity of the respondents. Finally, the names of participants were useful to complete some missing values of gender category in the data set corresponding to the questionnaire.

4. Results

4.1 Descriptive Statistics

Sociodemographic and connectivity aspects

The following table shows[7] the main sociodemographic variables included in the data set of the baseline study. As seen in the table, the study had higher participation of women (56.4%) and young people. Significantly few older people participated in the survey as the first filter incorporated people using the Internet at the time in the isolated rural population studied. Given rural context reality where the main activities are related to land work (and considering the age of the respondents), the vast majority of the participants were workers at the time of being consulted (77.2%).[8] The questionnaire included ten categories to describe the level of studies; in this case, the author organised the responses in four groups. Most respondents had a complete or incomplete high-school education (46.6%), and only 19.2% had university studies or higher.

[7] The socio-economic level variable was not included by the author due to its low reliability. According to the information provided by the expert, it was eliminated because of its high rate of lost values and the difficulty of the interviewees to answer this question.

[8] It is important to note that this variable also presents problems according to the expert interviewed since, in the rural context, many people do more than one job.

Table 5. Sociodemographic Variables

	N	%
a) Gender		
Female	274	56.4
Male	212	43.6
b) Age		
Between 15 and 29 years old	211	43.4
Between 30 and 50 years old	246	50.6
More than 50	29	6
c) Occupation		
Student	37	7.7
Worker	373	77.2
Student and worker	10	2.1
Homemaker	50	10.4
Unemployed or laid-off	13	2.7
d) Level of education		
Elementary school or lower	67	13.8
Complete or incomplete high-school education	226	46.6
Complete or Incomplete technical education or incomplete university	99	20.4
University or higher	93	19.2

Source: Translation from Pino, 2013.

Isolation

The population considered in this study is characterised by living in highly isolated sectors of Chile. The baseline study sample was designed[9] considering an isolation index, comparing a community close to one major urban centre that uses the Internet (Santiago), from another far away from it (Aysén Region). Thus, they obtained 623 cases, where 79.5% of them correspond to a population with “very high” isolation (Aysén Region) and 20.5% to “high” isolation (Metropolitan Region).[10]

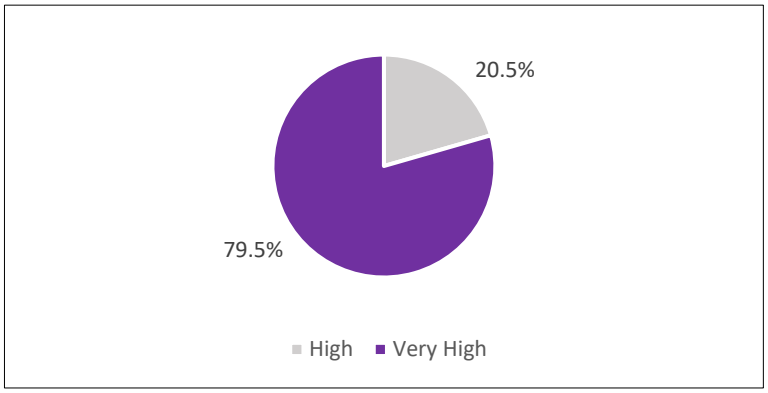
In Figure 1, you can see the percentage of people within the sample that were in a very highly isolated situation. These represent the four counties of the Aysén Region included in

[9] The procedure was described by Rubén Pino in an interview with the author (03/09/20). This expert designed the baseline study.

[10] The measure of the level of isolation is by county, categorised by an index built by a committee of experts—the baseline study considered counties which level of isolation were "high" and "critical". For better comprehension, the author changed the name of the category from "critical" to "very high".

the study. The highly isolated population corresponds to the two most isolated counties in the Metropolitan Region.

Graph 1. Level of Isolation



Source: Own elaboration using SPSS.

The feeling or perception of isolation was covered by a set of questions with multiple-choice answers. This group of variables asked: "*Do you feel isolated in any of the following aspects?*" The following table shows the proportion of cases reported affirmatively for each response category.

Table 6. Perception of Isolation Considering Various Dimensions.

Do you feel isolated in any of the following aspects?	
a. Geographical distance from other counties	49.0%
b. The access and connectivity make my county isolated	45.4%
c. The communication with people you are close with and live outside your county	18.8%
d. The difficulty to access to the Internet	29.1%
e. The distance where vital decisions that affect my county are made	42.4%
f. Places where employment and new business opportunities are	40.3%
g. I do not feel isolated in any aspect.	25.4%

Source: Own elaboration using SPSS.

As seen in Table 6, the perception of isolation is more significant when people are considering their geographical distance (49.0%), access and connectivity (45.4%). Two other significant categories (e and f) refer to the highly centralised situation that exists in the country. In Chile, job opportunities and political decisions are incredibly centralised in large urban centres. Considering the former, we can interpret that people who live in isolation feel that they are far from places of decision-making (42.4%) and available jobs (40.3%). It is essential to notice that 25.4% of the population in the study did not feel isolated at all.

Considering the perception of isolation of this population brings about the question if the Internet helped to reduce the perception of isolation. The variable was crossed with category c (Table 2) in the interrogation about the feeling of isolation precisely according to communication. These people were close to the respondents and lived outside their county.

Table 7. Internet Access, Isolation and Communication

	Would you say that the Internet helps you reduce your feeling of isolation...		
	Completely / Very much	Moderately	Not at all/ a little bit
The communication with people you are close to and live outside your county*	16.9%	26.0%	33.3%

Source: Translation and adaptation from Pino, 2013.

* Dichotomous variable: Multiple-choice question "Do you feel isolated in any of the following aspects?". The option consigned "Communication with people you are close with and live outside the county." The percentage corresponds to the cases that answer "yes".

Response rates are relatively low on this question, which could indicate that people did not use the Internet too much to communicate with others close to them. In the ego network analysis section, the location of those more intimate relationships in the studied networks can be seen.

Regarding the level of studies, a particular situation is generated in these territories since most of their inhabitants must migrate to neighbouring counties (or other regions) to complete secondary and higher education. When they asked about the feeling of isolation regarding geographical distances from other counties (category a Table 6), many respondents with technical or university studies answered affirmatively (80.0% and 83.5% respectively). In general, all the rates in the response options are high, indicating that many respondents feel geographic isolation. Still, it is much more noticeable in those with higher education.

Table 8. Level of Education and Geographical Distance

	Level of education			
	Basic education or less	Complete or incomplete high-school education	Complete or Incomplete technical knowledge, or incomplete university studies	University or higher
Geographical distance from other counties*	52.6%	60.7%	80.0%	83.5%

Source: Translation from Pino, 2013.

* Dichotomous variable: Do you feel isolated from geographic distances or not? The percentage corresponds to the cases that answer "yes".

Internet use

In addition to the above, a survey asked about the primary locations where users connected to the Internet regularly. In Table 5, you can find the answers to the question "*Where do you preferably use the Internet from? (indicate a maximum of 3 places)*". The primary response category was from home (79.9%), the second from the office (37.4%) and in third the cell phone (15%). It should be noted that by then (2011-2012) smartphones penetration in Chile was low because they were costly items, hence not massive. Today that reality has drastically changed, and they have become quite common even in rural areas.

Table 9. The Principal Access Points

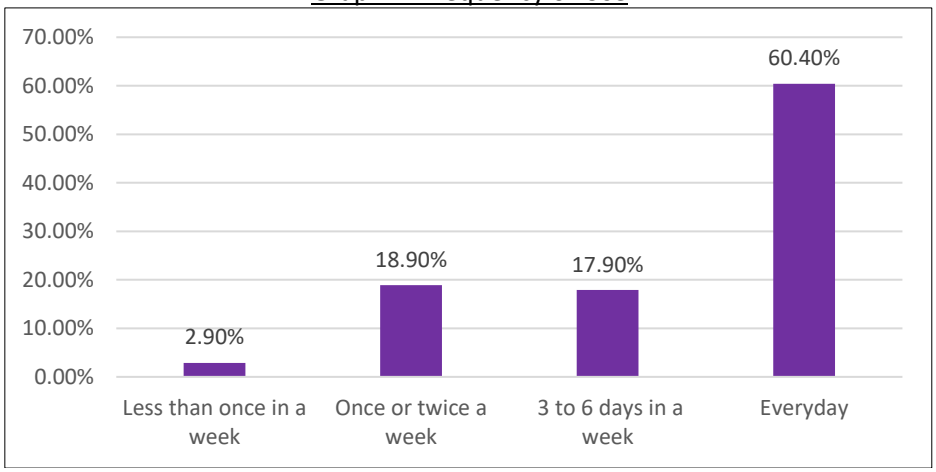
The principal internet access points	
Home	79.90%
Office	37.40%
School	2.50%
Internet café	1.80%
Telecentre	5.10%
Cell phone	15.00%
Other	1.20%

Source: Own elaboration

*Multiple choice question where they indicate a maximum of 3 places with choice of first, second and third preference.

Furthermore, the survey asked about how often users connected to the Internet. As can be seen in Graph 2, many users connected "every day" (60.4%), followed by the option "once or twice a week" (18.9%). Only 2.9% of those surveyed connected "less than once a week".

Graph 2. Frequency of Use



Source: Own elaboration

Social Capital

One of the most common questions to ask about social capital or social support is *"When you have a financial or personal problem, who do you turn to for support?"* In this survey, this issue was incorporated as a multiple-choice question where all the desired alternatives could be selected. The categories are detailed in Table 10.

Table 10. Social Capital through Social Support when Having a Financial or Personal Problem

When you have a financial or personal problem, who do you turn to for support?	
a. Direct relatives (couple, offspring)	65.7%
b. Other relatives (nephews, brothers, cousins)	26.8%
c. Friends	21.0 %
d. Neighbours or acquaintances	3.5%
e. Other people	7.2%
f. I do not ask for help	7.5%
g. I have no one to ask for help	0.3%

Source: Own elaboration

*The proportions of cases that respond to appeal for each type of support are indicated—multiple choice.

As can be seen previously, respondents mainly turned to direct relatives for social support (category a, 65.7%). In the second place, people asked for help from other relatives (category b, 26.8%). The answers are consistent with the literature review (Hofferth & Iceland, 1998) because these authors claim that in rural contexts, personal and close ties

govern social life. The fact that almost no one has chosen the category “I have no one to ask for help” (category g, 0.3%) shows that among these populations there are dense social framework and support in networks.

Immediately after the previous question, the respondents were consulted with whom of those people (categories a, b, c, d, and e) they communicated through the Internet. The multiple response questions obtained a meagre response rate in all the alternatives. This low rate may indicate that communication with support persons was probably mainly face-to-face at that time. In Table 11, you can see the response percentages for each category. The category with the highest selection, direct relatives, only obtained 13.8% of the proportion of cases.

Table 11. Respondent’s communication to their social network through the Internet

Do you keep in touch with these people through the Internet?	
a. Direct relatives (couple, offspring)	13.8%
b. Other relatives (nephews, brothers, cousins)	11.2%
c. Friends	7.4%
d. Neighbours or acquaintances	0.5%
e. Other people	1.0%

Source: Own elaboration

*The proportions of cases that respond to communicate with each type of support are indicated—multiple choice.

4.2 Multinomial regression models

Presentation

Model 1 was statistically significant, according to the Log-likelihood test, $\chi2(12) = 46.094$, $p < .001$. The deviance was 63.58 (df.46) and indicated a good model fit. Model 1 and the answer category "moderately" was not analysed because of its ambiguity and irrelevance in answering the research question. Both models had practically the same effect in general. Table 12 shows the parameters from Model 1, and Table 13 the parameters from Model 2.

Multinomial logistic regression was performed to ascertain the effects of gender, age, level of isolation and level of studies on the likelihood that participants felt that Internet access helped them to reduce the perception of isolation. The multinomial logistic regression model was statistically significant, $\chi2(18) = 71.505$, $p < .001$. Of the four predictor variables, only two were statistically significant when the answer question "moderately" is left out: age and level of studies (as shown in Table 13).

Young people from the category "not at all or a little bit" had a 0.66-time higher chance of having a perception that Internet access was useful to decrease their feeling of isolation. For the variable level of studies, the odds were similar in the primary and secondary level of education. In the primary group the people from the category "not at all or a little bit" had a 0.81 time higher chance of having the perception that the Internet helped to decrease the level of isolation, and the "non-isolated" category had 0.8.

At the secondary level, the group of people that answered "not at all or a little bit" had a 0.77 time higher chance of having a perception that Internet access was useful to decrease the feeling of isolation. The group of people that did not felt isolated had a 0.63-time higher chance of having the perception that the Internet was helpful to reduce the feeling of isolation.

Table 12. Parameter estimates Model 1.

Model 1[a]		b(SE)	95% CI for Odds Ratio		
			Lower Bound	Odds Ratio	Upper Bound
Not at all or a little bit	Intercept	-2.205 (0.542) ***			
	Gender	-0.197 (0.312)	0.446	0.821	1.512
	Age	0.670 (0.328) *	1.028	1.954	3.715
	Level of Isolation	-0.436 (0.347)	0.328	0.647	1.276
	Level of Studies 1	1.457 (0.630) *	1.248	4.292	14.763
	Level of Studies 2	1.210 (0.477) **	1.316	3.353	8.541
	Level of Studies 3	0.297 (0.614)	0.404	1.346	4.484
Moderately	Intercept	-1.192 (0.337) ***			
	Gender	0.498 (0.214) *	1.082	1.646	2.502
	Age	0.418 (0.212) *	1.003	1.519	2.303
	Level of Isolation	0.786 (0.283) **	1.261	2.195	3.821
	Level of Studies 1	-0.092 (0.401)	0.416	0.912	2.000
	Level of Studies 2	-0.27 (0.249)	0.469	0.763	1.244
	Level of Studies 3	-0.378 (0.313)	0.371	0.685	1.266

a. The reference category is: **A lot or completely**.

b. The parameters with zero value were deleted due to redundancy

*p<.05, **p<.01, ***p<.001.

Table 13. Parameter estimates Model 2.

Model 2[a]		b(SE)	95% CI for Odds Ratio		
			Lower Bound	Odds Ratio	Upper Bound
Non-isolated	Intercept	-0.831 (0.335) **			
	Gender	-0.277 (0.218)	0.495	0.758	1.163
	Age	0.072 (0.224)	0.693	1.074	1.667
	Level of Isolation	0.126 (0.270)	0.668	1.135	1.927
	Level of Studies 1	1.386 (0.387) ***	1.874	4.000	8.537
	Level of Studies 2	0.561 (0.281) *	1.010	1.753	3.040
	Level of Studies 3	-0.123 (0.368)	0.430	0.885	1.818
Not at all or a little bit	Intercept	-2.236 (0.536) ***			
	Gender	-0.150 (0.310)	0.469	0.861	1.581
	Age	0.682 (0.326) *	1.044	1.977	3.746
	Level of Isolation	-0.493 (0.343)	0.312	0.611	1.196
	Level of Studies 1	1.490 (0.631) *	1.287	4.435	15.282
	Level of Studies 2	1.261 (0.476) **	1.389	3.530	8.971
	Level of Studies 3	0.358 (0.613)	0.430	1.430	4.756
Moderately	Intercept	-1.208 (0.333) ***			
	Gender	0.522 (0.213) *	1.110	1.686	2.560
	Age	0.425 (0.211) *	1.012	1.529	2.312
	Level of Isolation	0.806 (0.282) **	1.287	2.239	3.894
	Level of Studies 1	-0.113 (0.400)	0.407	0.893	1.958
	Level of Studies 2	-0.286 (0.248)	0.462	0.751	1.221
	Level of Studies 3	-0.430 (0.313)	0.353	0.651	1.201

a. The reference category is: **A lot or completely**.

b. The parameters with zero value were deleted due to redundancy

*p<.05, **p<.01, ***p<.001.

Isolation exposure and the impact of Internet access

Finally, to analyse the impact of Internet access on the perception of isolation, I furthered my research into model 2. I decided to use the odds ratio as a measure of association between the people that did feel isolated (or not) with the people who perceived that the Internet was helpful to reduce the feeling of isolation.

For that reason, only 434 cases were considered, leaving the "moderately" category out (173 cases) as well as 16 missing values. The question "*Do you feel isolated in any of these aspects?*" was revised under the response category of people that did not felt isolated. Table 14 showed the number of respondents that did not felt isolated but perceived that the Internet helps to reduce the feeling of isolation (6). The answer category "not at all or a little bit" was merged with non-isolated Internet users.

Table 14. Frequency table: People that did not feel isolated in any aspects.

	Regarding the Internet and your situation of isolation, you would say that the Internet helps you reduce your feeling of isolation…				
	Non-isolated	Not at all or a little bit	Moderately	A lot or completely	Total
I do not feel isolated in any aspect	148	2	2	6	158

Source: Own elaboration using SPSS

Out of the 623 respondents, 434 participants were selected as a subsample among rural Internet users, consisting of 280 who felt isolated and 154 that did not. Out of the subsample, 223 respondents were feeling isolated and considered that Internet access helped reduce the perception of isolation and 57 disagreed with this idea. The relationship was the opposite for people that did not present feeling of isolation. Six persons who did not felt isolated thought that Internet access helped reduce the sense of isolation and 148 persons did not felt isolation nor usefulness of Internet access either.

The probability of not feeling isolation and consider that the Internet does not have an impact on the perception of isolation was 0.725.

Table 15. Contingency Table: Feeling of Isolation and perception of the Internet's usefulness.

Internet access helps to reduce the perception of isolation	**Event of interest: Perception of isolation in rural counties of Chile** Present	Absent	Total
Agree	223 97.37%	6 2.63%	229
Disagree	57 27.4%	148 72.5%	205

Source: Own elaboration using SPSS

*All the respondents were Internet users.

**The category "moderately" was excluded, and there are 16 missing values.

4.3 Ego Networks Analysis

Characterisation

This section of the document shows the analysis performed on the ego networks that were collected in the baseline study. As already explained, 20 ego networks were set up focused on people living in geographic isolation in some of the counties where the survey was conducted. These correspond to the counties of *Villa O'Higgins* and *Cerro Castillo* in the Aysén Region and the county of *María Pinto* in the Metropolitan Region. The counties of the Aysén Region present a very high level of isolation, while the one in the Metropolitan Region has a high level.

The following Table 16 provided part of the qualitative information corresponding to each of the networks studied, including occupation and level of studies. More details of this information are in the appendix, where each of the networks is characterised according to specific attributes.

Table 16. Qualitative Information of Ego Networks.

	Alias	Gender	Age	Occupation	Level of studies	County
1	Matías	M	70	Independent worker	No information	Cerro Castillo
2	Iñaqui	M	65	Mechanic and carpenter	Primary education	Cerro Castillo
3	Orozimbo	M	59	Construction worker	Secondary education	Villa O'Higgins
4	Javier	M	43	Tour guide	University higher education	Villa O'Higgins
5	Valentina	F	13	Student	Primary education	Villa O'Higgins
6	María	F	31	Homemaker	Technical higher education	Cerro Castillo
7	Ximena	F	33	Accountancy	University higher education	Villa O'Higgins
8	Amelia	F	14	Student	Primary education	Cerro Castillo
9	Sofía	F	32	Secretary	Secondary education	Villa O'Higgins
10	Teresa	F	57	Craftswoman and homemaker	Primary education	Cerro Castillo
11	Constanza	F	21	Tour guide	University higher education	Villa O'Higgins
12	Penélope	F	69	Craftswoman	Secondary education	Cerro Castillo
13	Soledad	F	32	Librarian	Secondary education	Villa O'Higgins
14	Juan	M	20	Seasonal agricultural worker	Primary education	María Pinto
15	Pamela	F	16	Student	Primary education	María Pinto
16	Raúl	M	14	Student and helper in the family business	Primary education	María Pinto
17	Germán	M	30	Public employee (town hall)	University higher education	María Pinto
18	Tania	F	20	Public employee (town hall)	Secondary education	María Pinto
19	Felipe	M	26	Seasonal agricultural worker	Primary education	María Pinto
20	David	M	33	Public employee (town hall)	University higher education	María Pinto

Source: Own elaboration.

Qualitative data was consistent with the literature review concerning the level of studies and occupation. There are lots of cases with low levels of education and primary occupations (Berdegué et al., 2010).

The table below indicates some quantitative parameters of the ego networks that were analysed. The average age of the sample was 34.9. The age range was from 13 to 70, and there are significantly fewer respondents that were older than 33.

The average number of nodes was 12.55, and the mode was 10. It is noticeable that the density of these networks was relatively high in general. There even were three people whose ego networks have density 1; that is, all their contacts are related to each other.

Remarkably, two networks had precisely the same number of nodes and ties (number 5 and 10). These algorithms were precisely the same, and the networks looked incredibly similar; they only differ in the attributes of the nodes. These networks belonged to two women

from different counties and ages; this was noticed by triangulating information from table 16 and table 17. In 2012 Valentina was a student of 13 years old from *Villa O'Higgins* and Teresa was a craftswoman and homemaker of 57 years old from *Cerro Castillo*.

This comparison allowed us to discard hypothesis B.1.1. that suggested a relationship between network characteristics and age ranges. The assumption was that ego networks users of the sample collected had a fewer number of nodes and higher densities if they were older. As we can see in the comparison between network 5 and 10, age was not a variable that affected those metrics. There is the same structure for different ages. Despite that gender and level of isolation were the same.

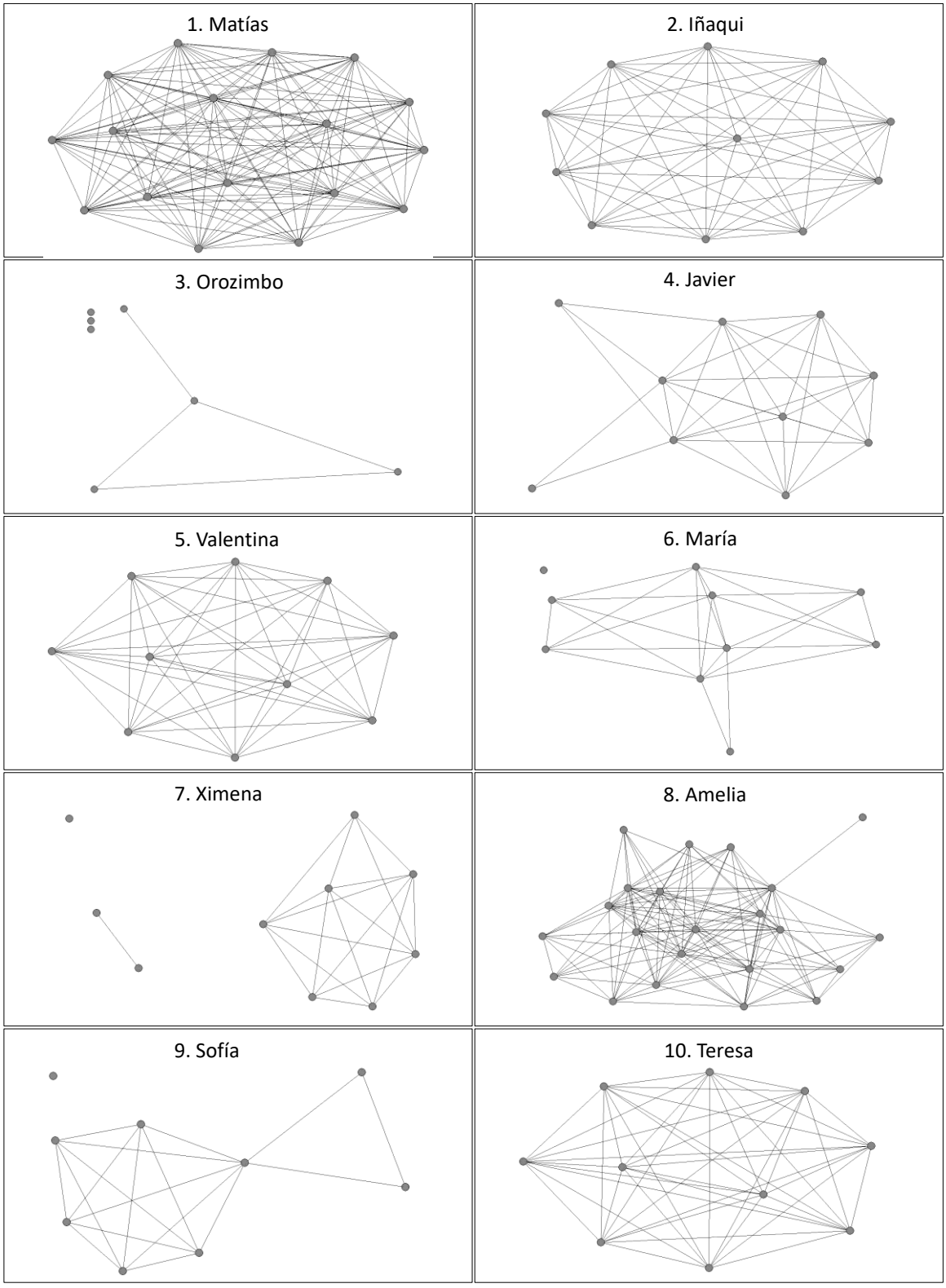
Regarding the components of the networks in the sample, we observed many networks with a single component or two. After the table, you can find the simple graphical representation of these 20 networks. Of the following ego networks, numbers 1 to 13 correspond to people from the Aysén Region. These networks were from the counties with very high isolation. Networks from 14 to 20 were from people living in the Metropolitan Region and corresponded a high level of seclusion.

Table 17. Quantitative Information of Ego Networks.

	Alias	Age	Nodes	Ties	Density	Components
1	Matías	70	17	272	1	1
2	Iñaqui	65	11	55	0.5	1
3	Orozimbo	59	7	8	0.19	4
4	Javier	43	10	66	0.7	1
5	Valentina	13	10	90	1	1
6	María	31	10	52	0.58	2
7	Ximena	33	10	40	0.44	3
8	Amelia	14	22	276	0.59	1
9	Sofía	32	9	36	0.5	2
10	Teresa	57	10	90	1	1
11	Constanza	21	10	50	0.56	1
12	Penélope	69	16	140	0.58	2
13	Soledad	32	10	48	0.53	1
14	Juan	20	17	94	0.35	3
15	Pamela	16	15	124	0.53	1
16	Raúl	14	10	44	0.49	1
17	Germán	30	14	28	0.15	5
18	Tania	20	14	58	0.32	2
19	Felipe	26	10	40	0.44	1
20	David	33	19	46	0.14	3

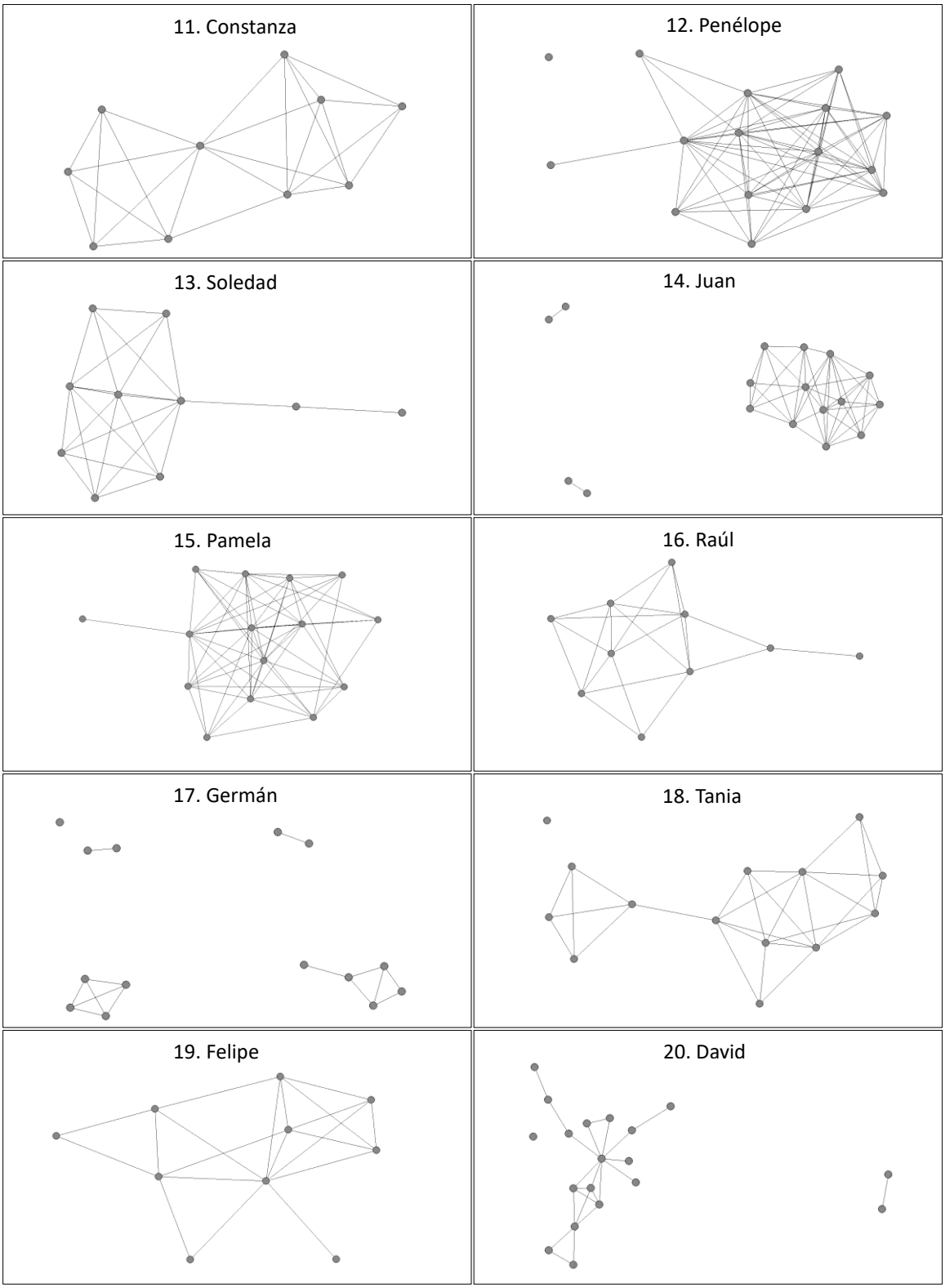
Source: Own elaboration using UCINET.

Figure 2. Ego networks (1 to 10)



Source: Own elaboration using UCINET.

Figure 3. Ego networks (11 to 20)



Source: Own elaboration using UCINET.

Tables 16 and 17 showed that there were no networks of people over 40 years old in the Metropolitan Region. When the sample between those networks that have 1 or 2 components were separated, we found that there mainly were from the Aysén Region. Interestingly, the three ego networks with more than three components in the Metropolitan Region belonged to young men. Those networks corresponded to numbers 14, 17 and 20. The respondents were Juan, Germán and David, who were 20, 30 and 33 years old respectively. Two of them were public employees (Germán and David), and Juan was a seasonal agricultural worker.

Below is a table with the most relevant information from this first part of the social network analysis. These metrics have been divided between the cases of the Aysén Region and the Metropolitan Region.

Table 18. Summary box

	Very High	High
Number of cases	13	7
Number of females	9	2
Number of males	4	5
Number of nodes (average)	11.69	14.14
Density (average)	0.63	0.35
Cases with 1 or 2 components	11	4
Cases with more than 3 components	2	3

Source: Own elaboration using UNICET.

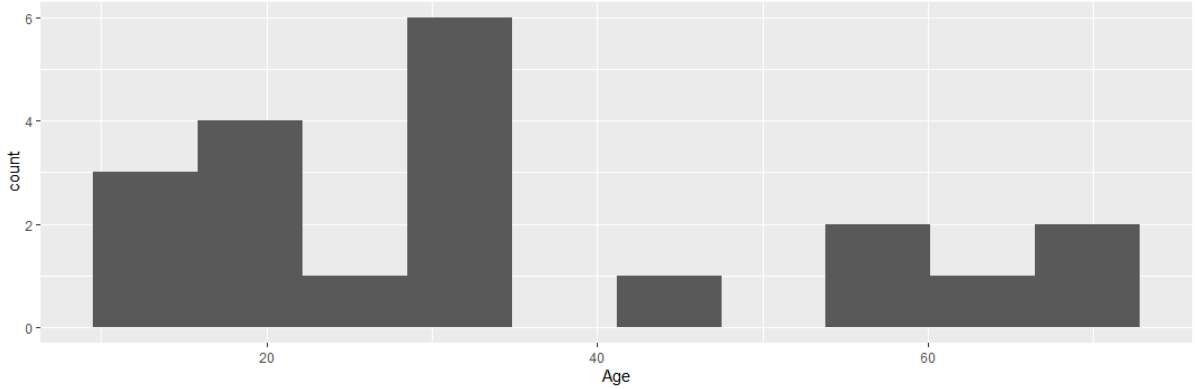
Age, Density and Components

The following plots were the result of the explorative analysis of the quantitative data presented in the previous section. The examination results consisted of five graphs identified with letters A, B, C, D and E. These graphs were made to answer research question B and research question B.1. Graphs A and B showed the distribution of the number of cases in comparison with age and number of components, and Graph C compared age with the number of components. In graph D, we saw a comparison between density and components of the networks. Finally, in Graph E, we saw the ages of participants and the density of their networks.

Graph A shows the number of cases by age range. This graph showed the researcher that the distribution of the age ranges of the sample was unproportioned because there were many interviewees in the range close to thirty years. At the same time, there was only one

case of 43 years. There were 25% of the cases of people over 57 years old, and 70% were respondents between 13 and 33 years old.

Graph A. Number of Cases and Age

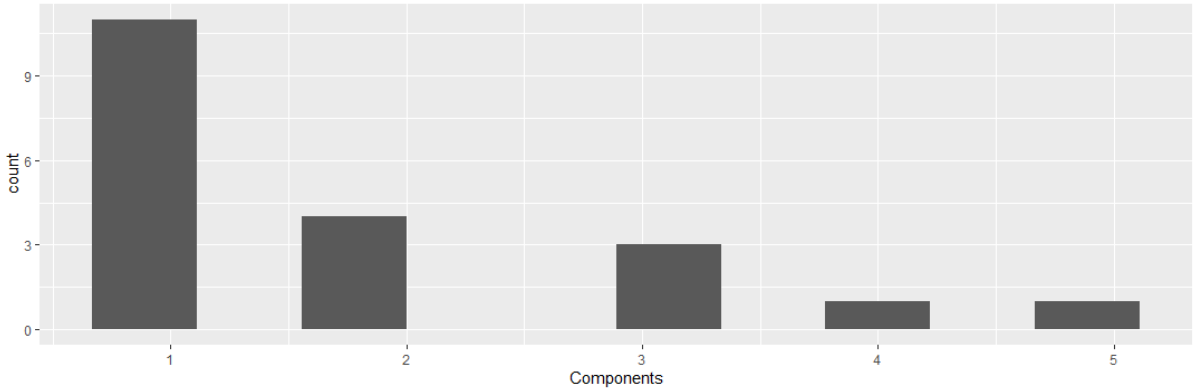


Source: Own elaboration using R.

Graph B shows the distribution of the cases concerning the number of components. Of the 20 networks, most had 1 component (11), and there was a total of 15 ego networks that had one or two components. Regarding the distribution of the number of components with the isolation variable, it turned out that among users living in the Aysén Region (very high isolation level), 88% present one or two components.

Of the total sample, 55% were people in high isolation who had 1 or 2 components in their network. Only 10% of the cases were people in very high isolation with networks of more than three components. These cases correspond to a man (Orozimbo, 59 years old) and a woman (Ximena, 33 years old).

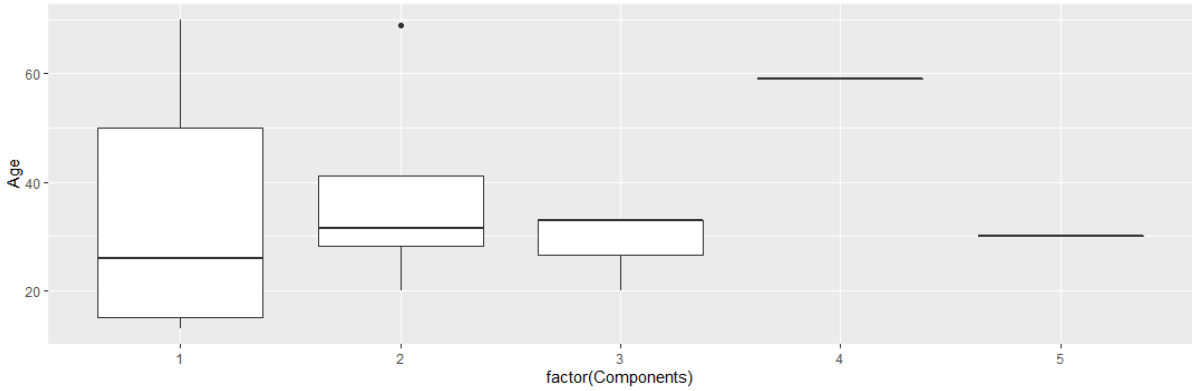
Graph B. Number of Cases and Components



Source: Own elaboration using R.

Boxplot graph C shows the age of Internet users and the number of components in their networks. We observed no significant trends could, considering the number of cases in the sample. However, from this graph, the age range of people who had only one component in their network was extensive. This observation allows us to rule out hypothesis B.1.1 completely. This hypothesis had already been questioned after the discovery of two equal algorithms of people of different ages. The small dot near the second box represents an extreme value of the distribution for that case.

Graph C. Age and Number of Components

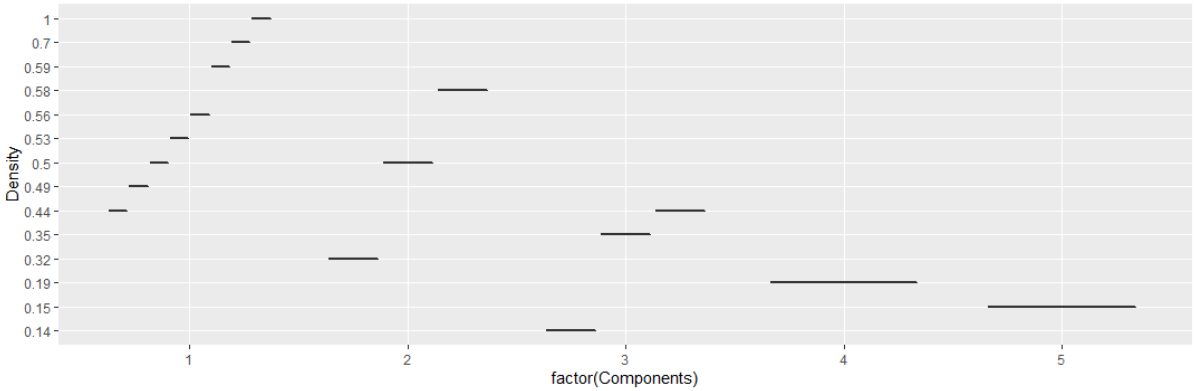


Source: Own elaboration using R.

In graph D, we observed the number of components of the sample networks in greater detail with the value of densities present in the sample. It was essential to consider that within the networks studied there were density values that are repeated. As a result, it was relevant not to confuse each of the lines with a case.

Within the area of each of the components, the densities of the ego networks were distinguished. The size of the lines depends on the number of density values that corresponded to each number of components. There are more lines in the left area of the graph because there were more sample networks with one component.

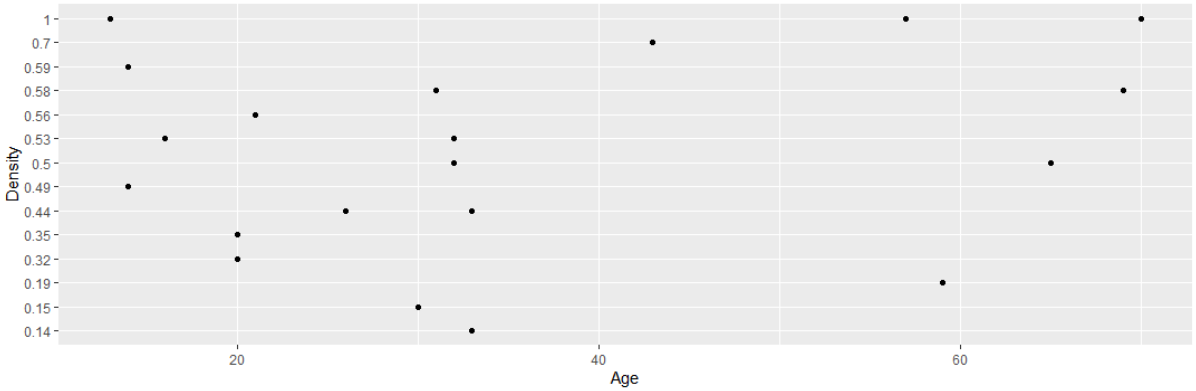
Graph D. Density and Number of Components



Source: Own elaboration using R.

Finally, graph E showed the age and density of the ego networks distributed in an area. Each point on the graph corresponds to a network, and age appears on the X-axis. The sample mainly compared young users. The low number of cases and the distribution of the model concerning age made it difficult to observe a trend that could relate age with the density of the networks. This graph provided information to definitively rule out the idea that age is related to network densities in this type of population.

Graph E. Density and Age



Source: Own elaboration using R.

5. Conclusion and findings

Based on the results shown, the last part of this document is assembled into three parts. The objective of this section is to properly present the conclusion and logically review the hypotheses. There was a lot of information left out from the thesis; thus, it is recommended to consult the appendices.

This first part of the conclusion is a review of the descriptive part of the questionnaire. This part of the research process had the objective of giving the background to answer research question A. It is crucial to characterise this population to understand their perception of isolation. It is essential to keep in mind that while everyone in the survey was an Internet user, not everyone had the same level of geographic isolation. Sociodemographic characteristics were dissimilar as well.

A model was done to demonstrate the impact of Internet use concerning the perception of isolation. This model is reported in the second section of the results with the sensitivity analysis of two compared multinomial regression models. As a result, the second section of the conclusions addresses the research question A. and to specify research question A.1

The Social Network Analysis had the purpose of examining individual social capital among the studied population. The illustration of ego networks was useful to achieve this goal. Nevertheless, the quantitative analysis shown in the graphs was crucial. Some of the sections of the questionnaire are also useful to understand this part, and the qualitative information is important to contextualise the networks. Hence, the third part of the conclusion covers research questions B and B.1.

5.1 Internet use in isolated locations of Chile

It is critical to characterise this population to understand the perception of isolation among these people. Due to sampling difficulties, from this point forward, we are going to consider this as a comparative study of cases between the Metropolitan Region and Aysén Region.

Much of the population in the study had a high-school education or less. By observing the sample corresponding to the ego networks analysis, several people had more than one job at the time of the study.

A quarter of the sample corresponds to the population that does not feel isolated. Furthermore, 20.5% of the cases belong to the Metropolitan Region. There could be an intersection or coincidence between these groups (high isolation and people that don't feel isolated) since the population with a high level of isolation is closer to Santiago. For example, the distance between Santiago and Villa O'Higgins is 2255.8 km. In contrast, the distance between Santiago and María Pinto is 53.9 km.

Another possibility is that the previous group did not feel isolated thanks to the availability of Internet access. Access to the Internet can reduce the feeling of isolation (Pino, 2013). 29.1% of the people in the universe declared they did not have Internet access problems. The quality of the Internet connection was very different in each county. The towns of the Aysén Region presented many more issues of Internet connectivity. These issues might be related to great geographical distance from the centre of the country, but also winds that could disrupt internet connections. It would be fascinating to delve into this intersection to investigate the characteristics of people who do not feel isolated.

People with higher levels of education were the ones who felt the most isolated concerning geographic distance from other counties. This fact is because in these localities there are no educational centres and people must migrate. This situation becomes all the more difficult for people from counties in the Aysén Region when the towns do not even have high-schools.

Regarding the main access point to the Internet, we see that users connected mainly from their home or office. It would be advisable to review other types of more up-to-date surveys

on this topic, mainly due to the high penetration of smartphones in Chile recently (SUBTEL, 2015; CASEN, 2011).

In conclusion, we find a digital divide on several levels. First off, there is a gap in access due to the difficulty connecting to the Internet. Additionally, there is a digital divide of management and use given that the inhabitants of rural areas have less interest or fewer digital skills (Correa & Pavez, 2016; Proenza, 2001). This research has also found evidence of a digital age gap, given that there are very few rural users who are over 50 years old. As a result, this is enough evidence to say there are substantial inequalities around this interest area.

5.2 The effect of Internet access in the perception of isolation

According to the proposed model and the revised literature, it can be confirmed that Internet access affected the perception of isolation among the rural population of Chile. In this comparison between the Metropolitan Region and Aysén Region, we were able to confirm that rural users think that Internet access diminishes their perception of isolation.

Once the missing values from the variable of interest were examined, we could build a model that was able to be interpreted. In the question "Regarding the Internet and your situation of isolation, would you say that the Internet helps you reduce your feeling of isolation? The "moderately" category had 173 cases, but it produced some ambiguities. We cannot say if those Internet users do not feel isolated or do not think that the Internet helps to diminish their feeling of isolation.

Considering the previous question, we extracted the category moderately to work with a group of 434 participants. The odds of the people that agree and are isolated over the people that agree but are not isolated is 37.16 (OR). On the contrary, the odds of the people that disagreed with the statement over the people that do not feel isolated at all was 0.38 (OR).

According to research question A.1, the model allowed distinguishing that gender, age, level of isolation and level of studies were significant at different levels in different answer groups. For the category "moderately", gender, age and level of isolation were significant, but we did not explore this answer category in detail.

Age was significant only in the “not at all or a little bit” category, with a confidence interval of 95%. The odds of feeling that Internet access did not help to reduce the perception of isolation among young people in comparison to the older group of people were 1.97 (OR).

Level of studies was significant in two answer categories, “not at all or a little bit” and “non-isolated”. In both groups, the odds were similar for participants in the primary education category. The non-isolated group presents the most significant difference with a 99.9% confidence interval; the odds of people not perceiving isolation and being less educated over the group of people that had university studies was 4.0 (OR). Considering this, we can say that younger people with more studies have more risk of feeling isolated than the less educated participants.

5.3 Individual Social Capital in isolated locations of Chile

At the time of analysing social capital, two questions from the questionnaire were selected to complement the ego network analysis. Based on this information, it has been verified that the respondents build their social support networks mainly with direct relatives. This information confirms what was stated by Hofferth & Iceland (1998). At the time of asking if people communicated with their contacts online, the response rate was low presenting low percentages and lots of missing values. Consequently, this suggests that the relationships were mainly face-to-face by then.

The previous information confirms part of Hypothesis B; specifically, that ego networks from rural users are mainly oriented toward close ties. Out of the sample, the majority of the network structures showed a low number of nodes. Density is lower in the Metropolitan Region, indicating that the hypothesis might be in the right direction. More cases are undoubtedly needed to validate the hypothesis. A possible future area of research would be comparing these networks with ego networks of people in urban areas.

With the qualitative information from the networks, (it can be observed that) most of the cases correspond to people who had a secondary or lower level of education. Although (3) three of the cases correspond to students, there are nine people out of twenty with a low level of studies. This can be triangulated with the information from the literature review and

statistical analysis, (where it is) which (highlighted) highlight that participants in rural areas have a lower level of studies.

It is important to contextualise the number of nodes and the structure of the system despite networks generally having few nodes. According to Bellotti (2015), it is desirable to do this analysis of ego networks with an ethnographic background. In this case, a study was carried out that constitutes an excellent example of contextualisation. The analysis of the questionnaire and the ethnographic experience in the field (in counties of the Aysén Region and the Metropolitan Region) were valuable; both were integral to analyse and contextualise the analysis of social networks.

Hypothesis B.1.2 is also confirmed by this research. The social networks of users presented a lot of differences when we compare the group of people from very high isolated counties with the other highly isolated ones. To notice that comparison, the best way is to look at the networks diagrams and confirm the differences in the summary box.

On the other hand, hypothesis B.1.1 has been discarded for two specific reasons. First off, the evidence that there are two virtually equally structured networks from people of different ages and counties, both in the very high isolation category. The second can be seen in graph C, where the age range of networks with one component is vast.

Finally, I want to provide an ethnographic contextualisation from Patagonia. Whenever you go to the Patagonian territory, which is wider than the Aysén Region, you will hear a famous saying; *"En la Patagonia, el que se apura pierde el tiempo".* In English it means something like: "*In Patagonia, the one who hurries wastes time*". It is illustrative of what Bauman (2005) says: time is slower in rural areas. Therefore, the slower temporality may be associated with the frequency of the interaction, and consequently, (the) networks have fewer actors there. However, social capital is high, given that support networks are dense. In general, the relationships are direct, and the structures of the networks are more cohesive in the Aysén Region. Henceforth, further research into the topic of ego network analysis in rural contexts would be worthwhile, particularly by comparing contrast with urban locations in Patagonia such as Punta Arenas as an isolated but metropolitan area.

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Appendix A. Translations

1. *"Regarding the Internet and your situation of isolation; you would say that the Internet helps you reduce your feeling of isolation…(not at all, a little bit, moderately, a lot or completely)*.

   "Respecto de Internet y su situación de aislamiento, Usted diría que Internet le ayuda a reducir su sensación de asilamiento... (nada, un poco, moderadamente, mucho o completamente)

2. *Do you feel isolated in any of the following aspects?*
   a. *Geographical distance from other counties*
   b. *The access and connectivity make my county isolated*
   c. *The communication with people near the county*
   d. *The difficulty to access to the Internet*
   e. *The distance where important decisions that affect my county are made*
   f. *Places where employment and new business opportunities are*
   g. *I do not feel isolated in any aspect*

   ¿Usted se siente aislado en alguno de los siguientes aspectos?
   a. *Distancia geográfica de otras comunas*
   b. *El acceso y conectividad vial hace que mi comuna sea aislada*
   c. *La comunicación con personas cercanas fuera de la comuna*
   d. *La dificultad para acceder a Internet*
   e. *La distancia a los lugares donde se toman las decisiones importantes que afectan a mi comuna*
   f. *Los lugares en donde está el empleo y mejores oportunidades de negocio*
   g. *No me siento aislado en ningún aspecto*

3. *What is your level of studies?*
   a. *No education*
   b. *Incomplete primary education*
   c. *Complete primary education*
   d. *Incomplete secondary education*
   e. *Complete secondary education*
   f. *Incomplete higher technician education*
   g. *Complete higher technician education*
   h. *Incomplete university higher education*
   i. *Complete university higher education*
   j. *Postgraduate*

   ¿Cuál es su nivel de estudios?
   a. *Sin educación*
   b. *Básica incompleta*
   c. *Básica completa*
   d. *Media incompleta*
   e. *Media completa*

f. *Técnica incompleta*
g. *Técnica completa*
h. *Universitaria incompleta*
i. *Universitaria completa*
j. *Post título*

4. *What do you do currently?*
   a. *Student*
   b. *Worker*
   c. *Student and worker*
   d. *Homemaker*
   e. *Unemployed or laid-off worker*

   ¿A qué se dedica en la actualidad?
   a. *Estudia*
   b. *Trabaja*
   c. *Estudia y trabaja*
   d. *Dueña de casa*
   e. *Desempleado o jubilado*

5. *Cuando tiene algún problema económico o personal, ¿a qué personas recurre en busca de apoyo?*
   a. *A sus familiares directos (pareja, hijos o nietos)*
   b. *A otros familiares (sobrinos, hermanos, primos, etc.)*
   c. *Amigos/as*
   d. *Vecinos o conocidos*
   e. *Otras personas*
   f. *No le pido ayuda a nadie*
   g. *No tengo a quien recurrir*

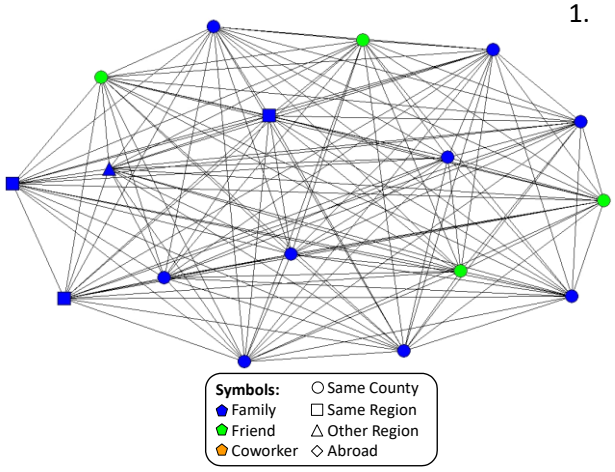
   When you have a financial or personal problem, who do you turn to for support?
   a. Direct relatives (couple, offspring or grandchildren)
   b. Other relatives (nephews, brothers, cousins, etc.)
   c. Friends
   d. Neighbours or acquaintances
   e. Other people
   f. I do not ask for help
   g. I have no one to ask for help

Appendix B. Ego networks

Ego network analysis

Figure. Ego network 1, Matías.

1.



Name: Matías

Age: 70

Gender: Male

Level of Studies: No Information

Usual Place of Connection: Local Library

Frequency of Connection: Twice a month

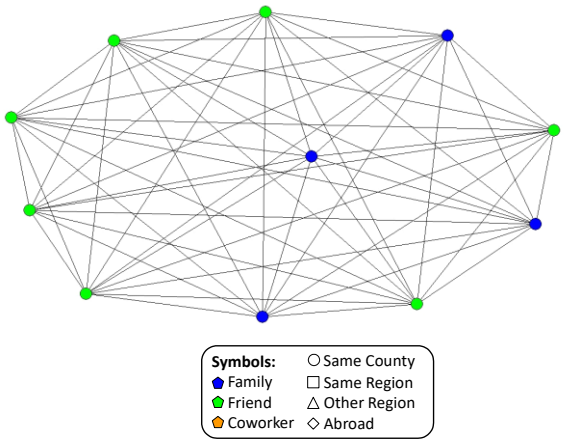
County: Cerro Castillo

Region: Aysén Region

Occupation: Independent Worker

Figure. Ego network 2. Iñaqui.

2.



Name: Iñaqui

Age: 65

Gender: Male

Level of Studies: Elementary School

Usual Place of Connection: Home

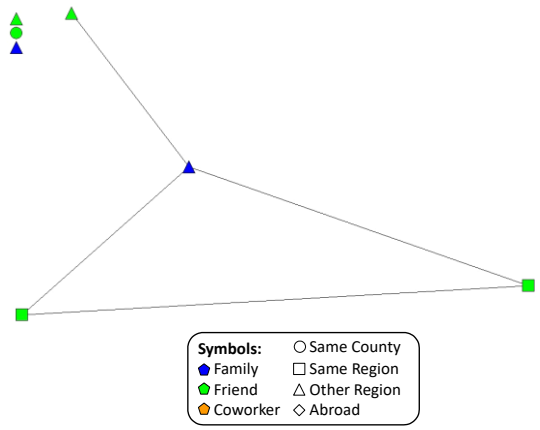
Frequency of Connection: Once a month

County: Cerro Castillo

Region: Aysén Region

Occupation: Mecanic and Carpenter

Figure. Ego network 3. Orozimbo.



3.

Name: Orozimbo

Age: 59

Gender: Male

Level of Studies: High School

Usual Place of Connection: Home

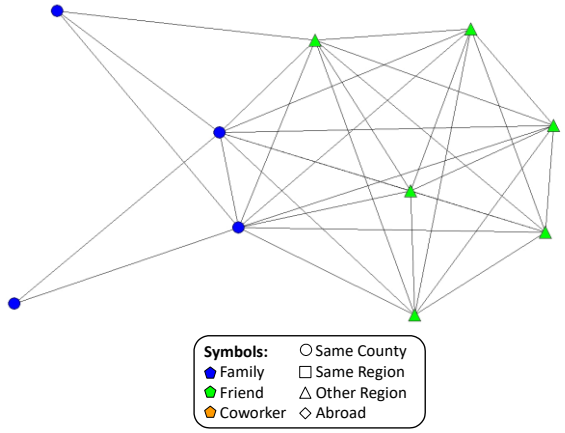
Frequency of Connection: Every day

County: Villa O'Higgins

Region: Aysén Region

Occupation: Construction Worker

Figure. Ego network 4. Javier.



4.

Name: Javier

Age: 43

Gender: Male

Level of Studies: University Studies

Usual Place of Connection: Office

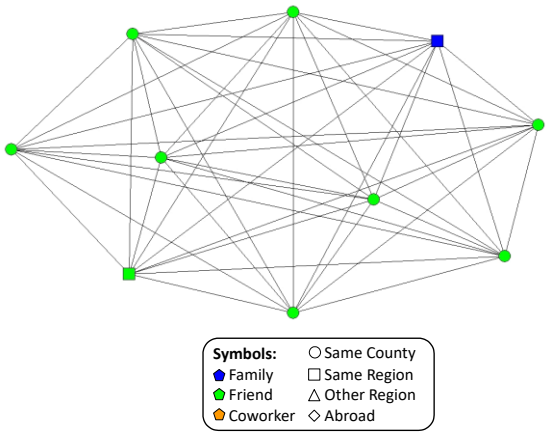
Frequency of Connection: Every day

County: Villa O'Higgins

Region: Aysén Region

Occupation: Tourist Guide

Figure. Ego network 5. Valentina.



5.

Name: Valentina

Age: 13

Gender: Female

Level of Studies: Incomplete High school

Usual Place of Connection: Home

Frequency of Connection: Every day

County: Villa O'Higgins

Region: Aysén Region

Occupation: Student

Figure. Ego network 6. María.

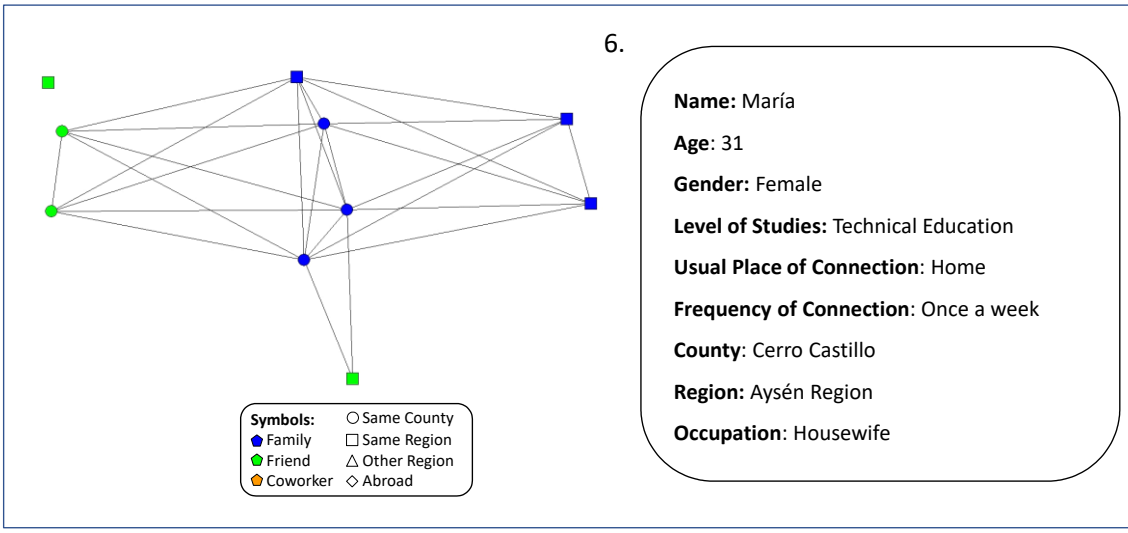


Figure. Ego network 7. Ximena.

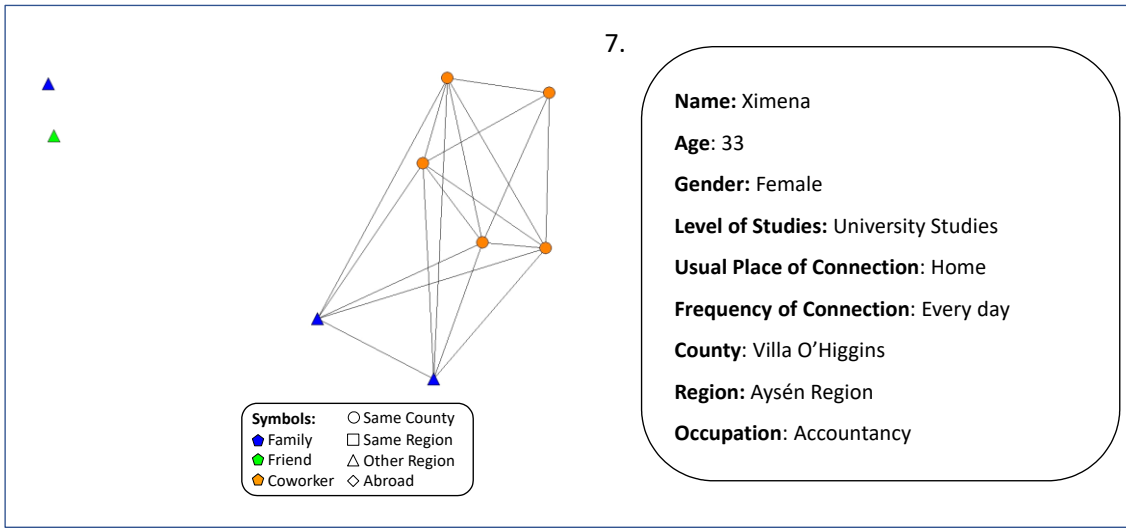


Figure. Ego network 8. Amelia.

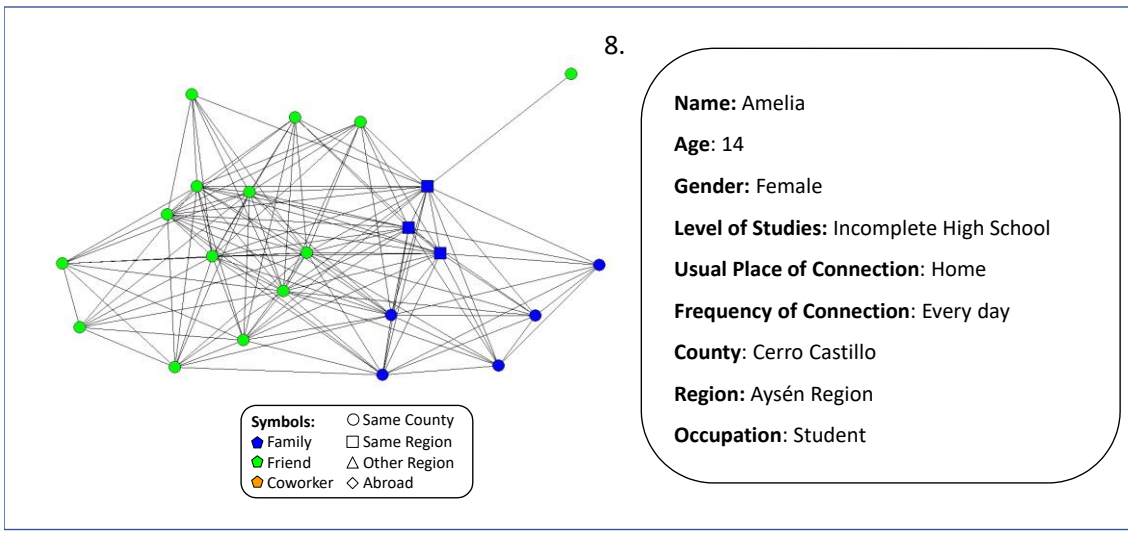


Figure. Ego network 9. Sofía.

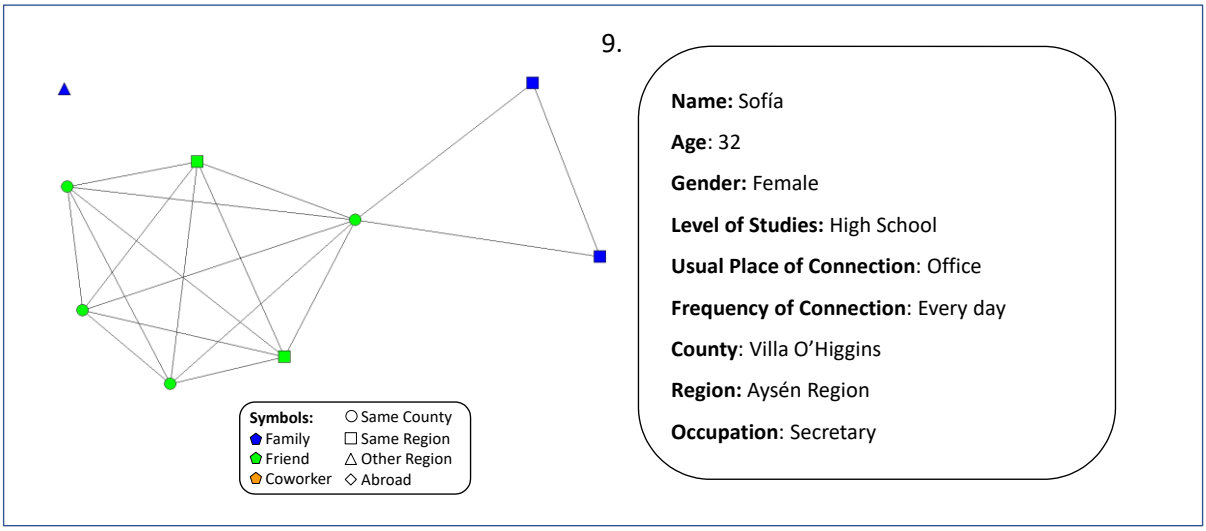


Figure. Ego network 10. Teresa.

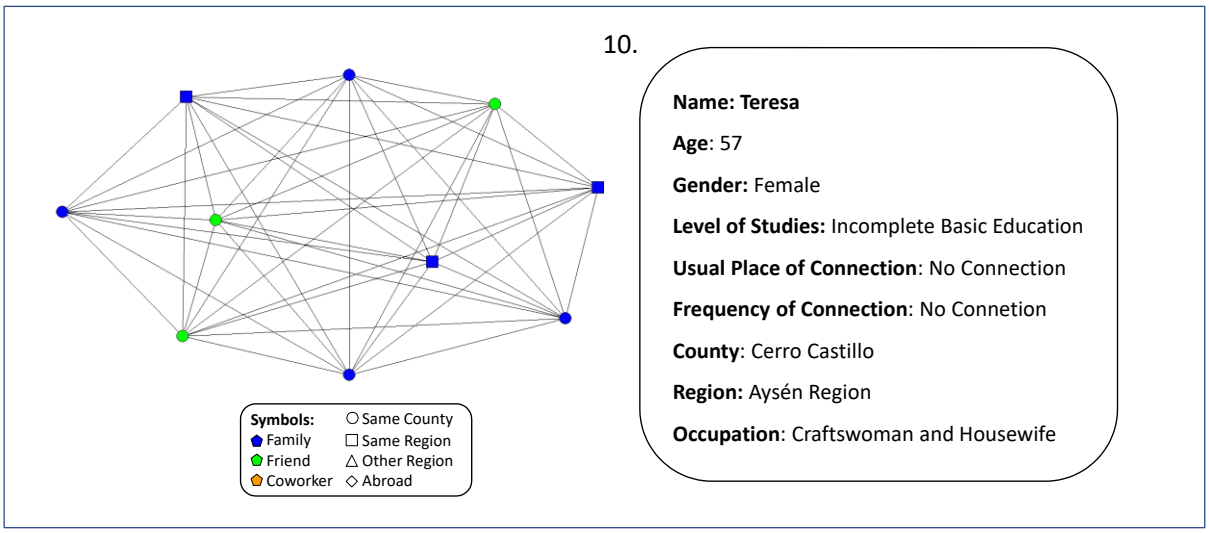


Figure. Ego network 11. Constanza.

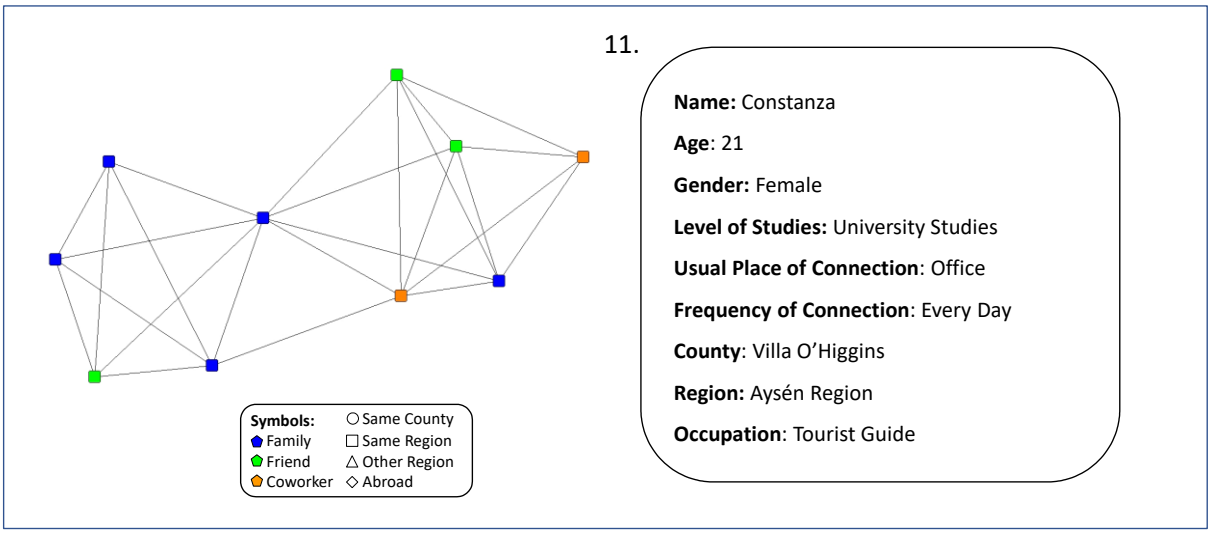


Figure. Ego network 12. Penélope

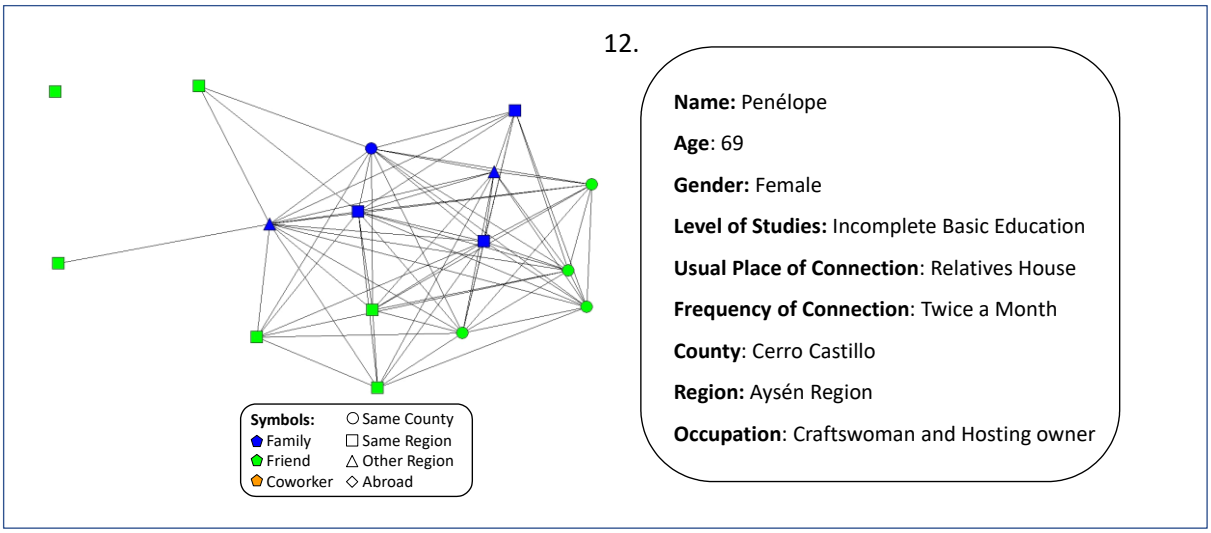


Figure. Ego network 13. Soledad.

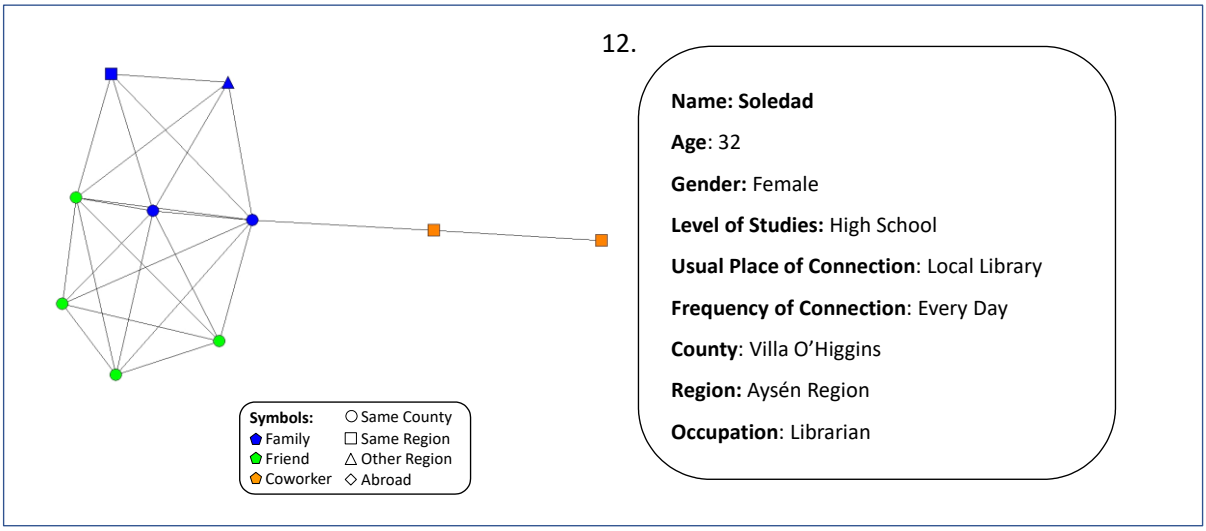


Figure. Ego network 14. Juan.

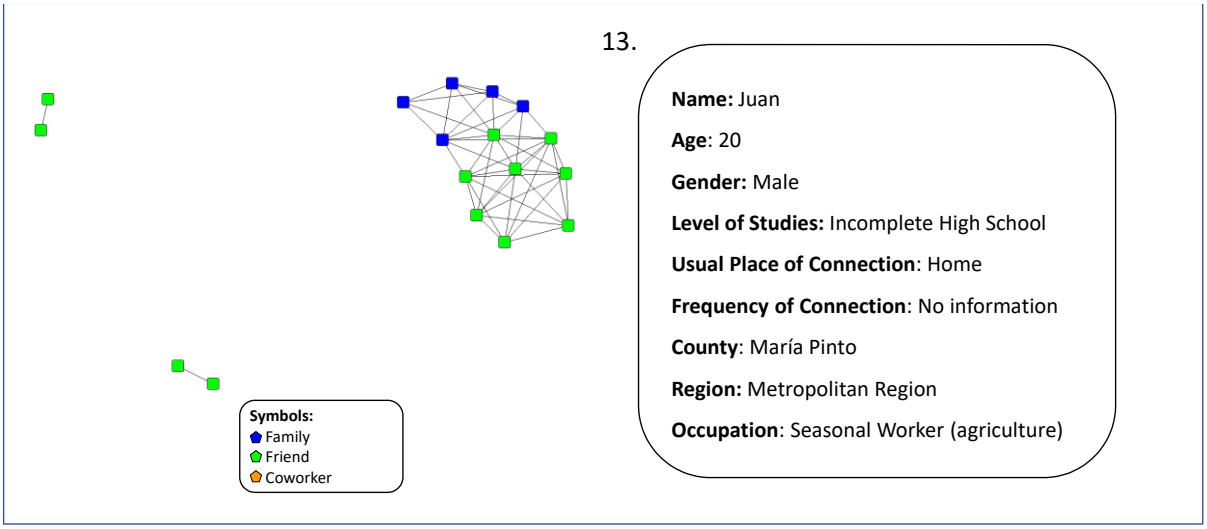


Figure. Ego network 15. Pamela.

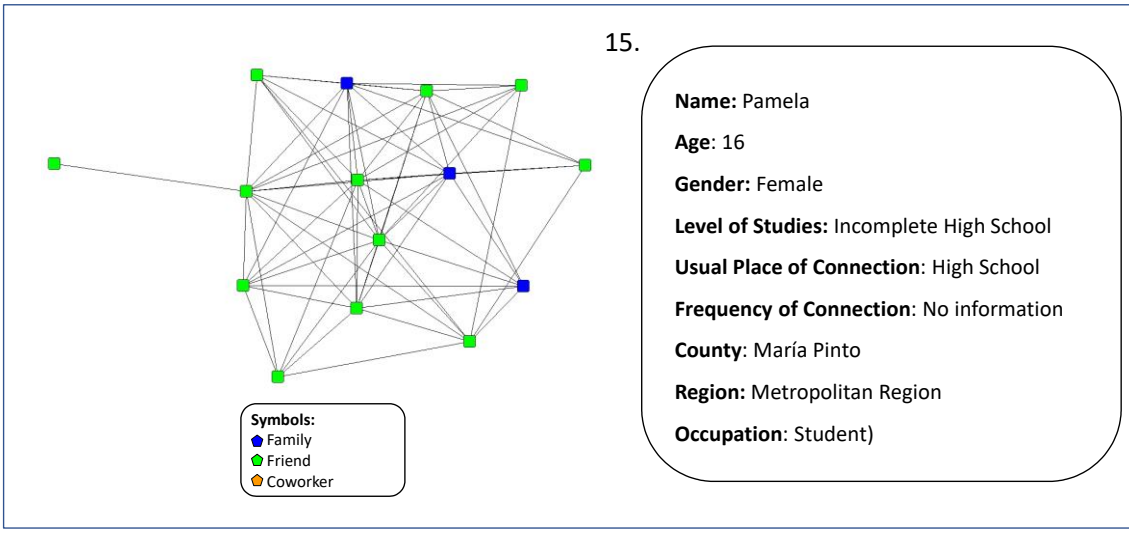


Figure. Ego network 16.Raúl.

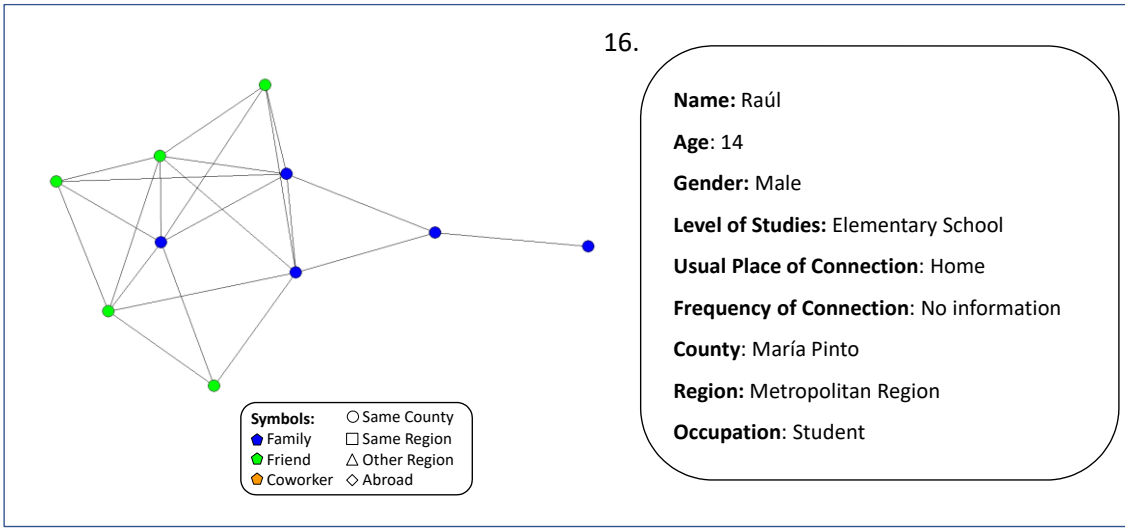


Figure. Ego network 17. Germán.

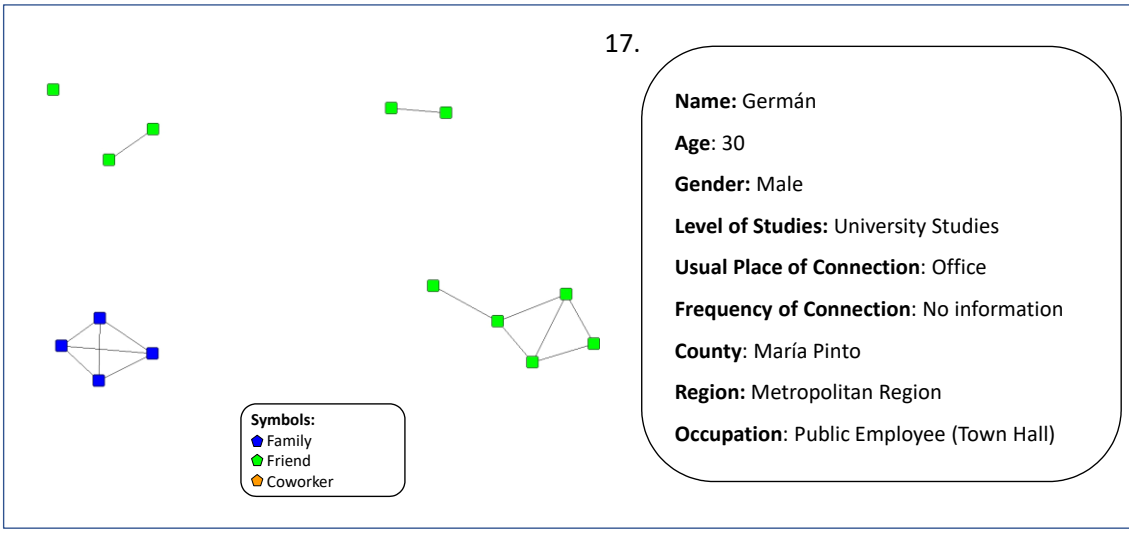


Figure. Ego network 18. Tania.

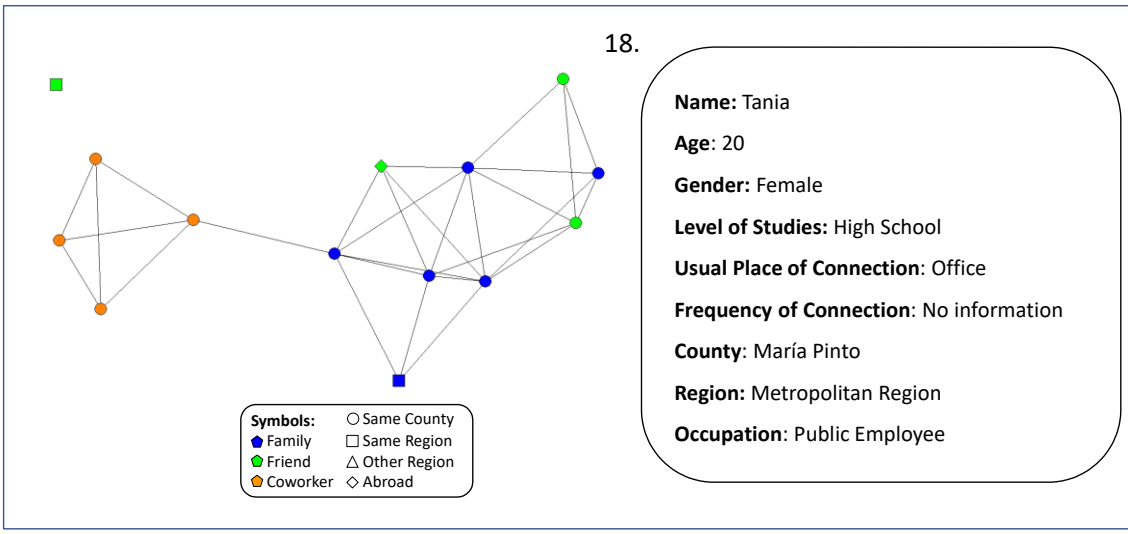


Figure. Ego network 19. Felipe.

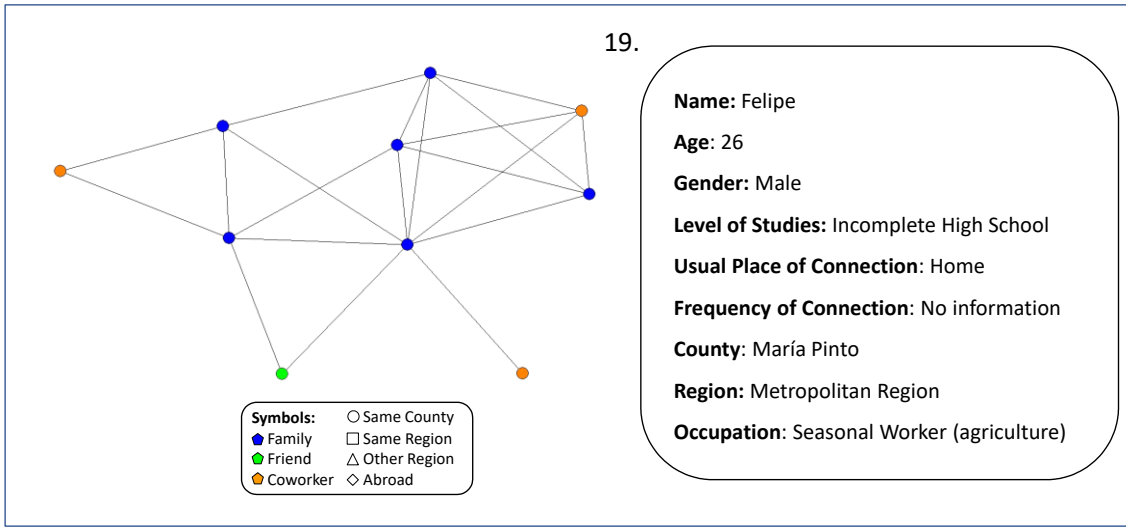
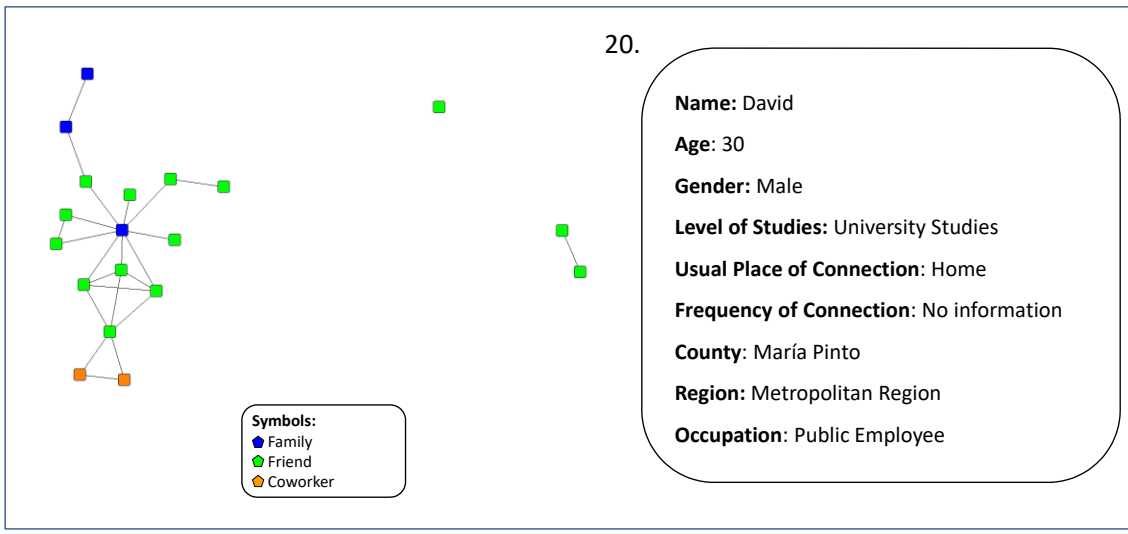
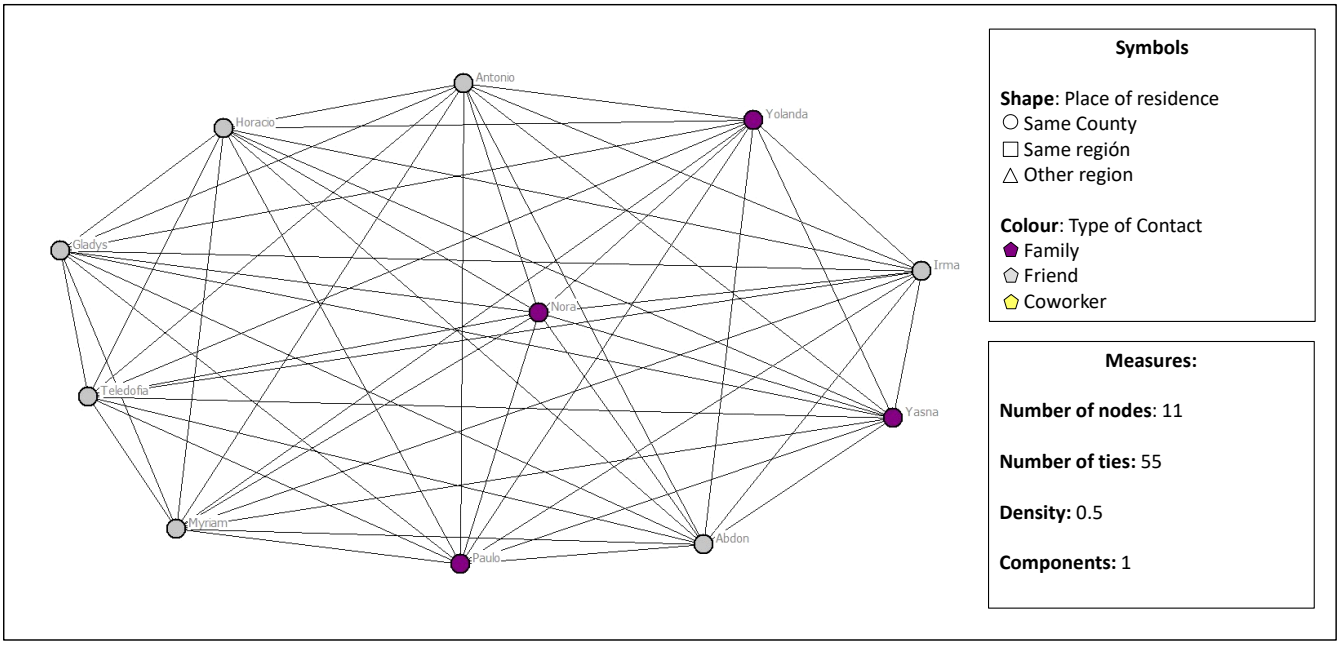


Figure. Ego network 20. David.



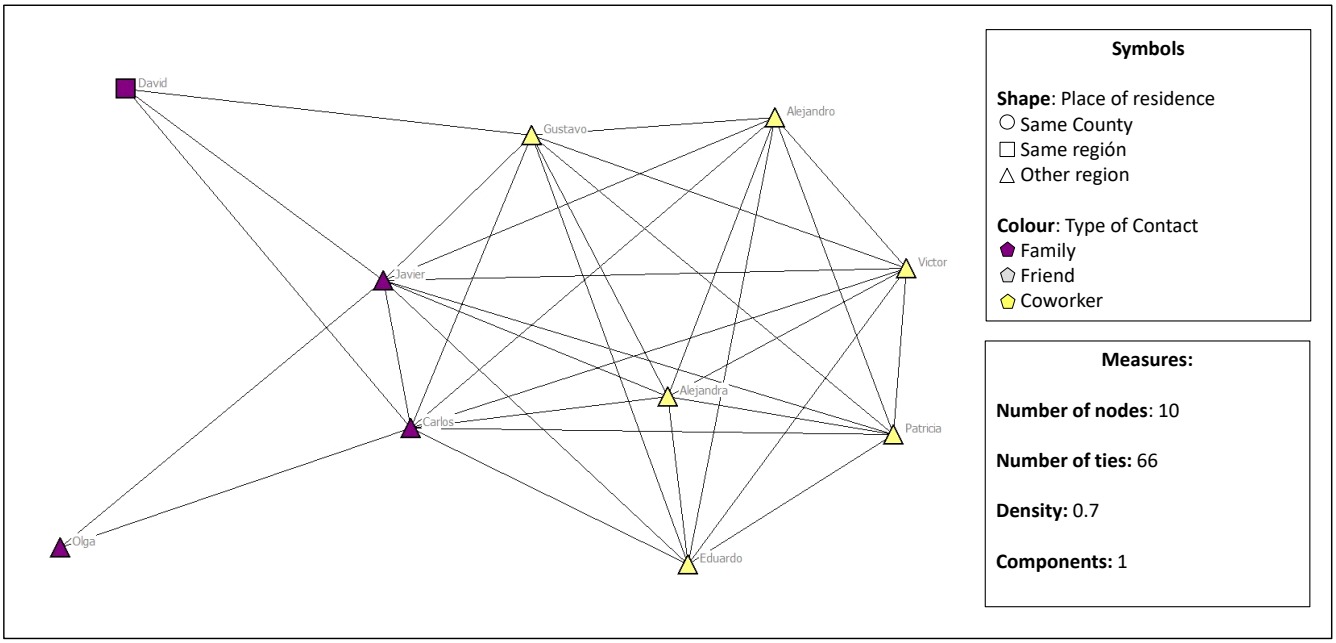
Selection of three illustrative cases

Figure a. Iñaqui's Ego Network



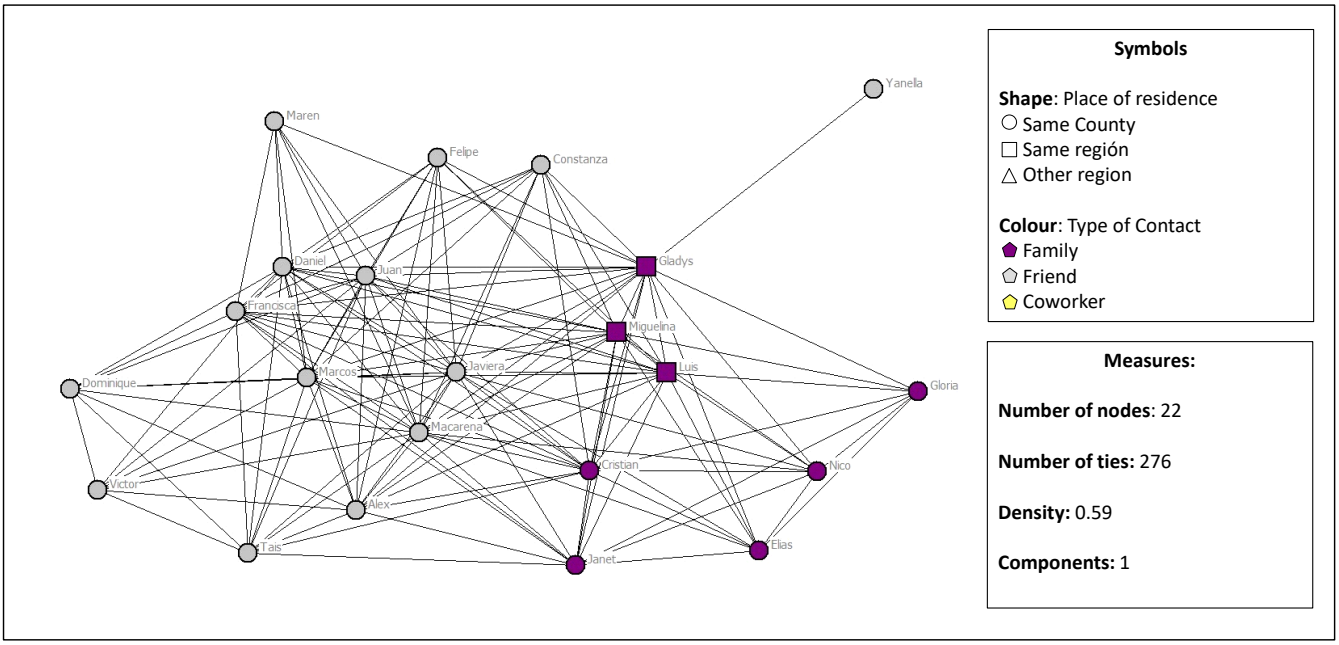
Source: Own elaboration using UCINET.

Figure b. Javier's Ego Network



Source: Own elaboration using UCINET.

Figure c. Amelia's Ego Network



Source: Own elaboration using UCINET.

Appendix C. Syntaxis and Codes

SPSS Syntaxis

****Variables Recodification**

```
DATASET ACTIVATE DataSet1.

RECODE Sexo (0=0) (1=1) (ELSE=Copy) INTO Gender.

VARIABLE LABELS  Gender 'Gender'.

EXECUTE.


RECODE F1.2_edad_registro (3=2) (4=3) (1 thru 2=1) (ELSE=Copy) INTO Age.

VARIABLE LABELS  Age 'Age'.

EXECUTE.


RECODE Aislamiento (1=1) (2=0) (ELSE=Copy) INTO Isolation.

VARIABLE LABELS  Isolation 'Level of Isolation'.

EXECUTE.


RECODE P38_ayuda (1=4) (2=3) (3=2) (4 thru 5=1) (ELSE=Copy) INTO Internet_perception.

VARIABLE LABELS  Internet_perception 'Perception of Isolation and Internet use'.

EXECUTE.


RECODE P12.1_work_studies P12.7_communication (1=0) (2=1) (3=1) (4=1) (ELSE=Copy)
INTO

   P12.1_work_studies_dummy P12.7_communication_dummy.
```

```
VARIABLE LABELS  P12.1_work_studies_dummy 'How often do you use the Internet to find information '+
    'for work or studies?' /P12.7_communication_dummy 'How often do you use the Internet to '+
    'communicate with acquaintances?'.
EXECUTE.


DATASET ACTIVATE DataSet1.
RECODE Age (1=1) (2=2) (3=2) (MISSING=SYSMIS).
EXECUTE.

RECODE Occupation (1=2) (2=1) (MISSING=SYSMIS) (3 thru 6=2).
EXECUTE.

RECODE Studies (MISSING=SYSMIS) (1 thru 3=1) (4 thru 5=2) (6 thru 7=3) (8 thru 10=4).
EXECUTE.

USE ALL.
COMPUTE filter_$=(Internet_perception = 1 - 4).
VARIABLE LABELS filter_$ 'Internet_perception = 1 - 4 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
```

```
USE ALL.

COMPUTE filter_$=(Internet_perception  <= 1).

VARIABLE LABELS filter_$ 'Internet_perception  <= 1 (FILTER)'.

VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.

FORMATS filter_$ (f1.0).

FILTER BY filter_$.

EXECUTE.


DATASET ACTIVATE DataSet1.

RECODE Internet_perception (1=1) (2=2) (3=3) (4=3) (MISSING=4) INTO
Internet_perception_isolation.

VARIABLE LABELS  Internet_perception_isolation 'Regarding the Internet and your situation
of '+

    'isolation, you would say that the Internet helps you reduce your feeling of'.


EXECUTE.

RECODE Internet_perception_isol (SYSMIS=3) (ELSE=Copy) INTO perception_isol_internet.

VARIABLE LABELS  perception_isol_internet 'Regarding the Internet and your situation of '+

    'isolation, you would say that the Internet helps you reduce your feeling of'.

EXECUTE.
```

****Variables correlation**

```
CORRELATIONS
  /VARIABLES=P12.1_work_studies P12.2_infromation_news P12.3_shopping
P12.4_procedures
    P12.5_entertainment P12.6_cyber_activism P12.7_communication
P12.8_meet_new_people P12.9_sell
    P16.1.1_communication_family_friends P12.1.2_meet_people P16.1.3_personal_content
    P16.1.4_cultural_content
  /PRINT=TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

****Exploratory Factorial Analysis**

```
FACTOR
  /VARIABLES P12.1_work_studies P12.2_infromation_news P12.3_shopping
P12.4_procedures
    P12.5_entertainment P12.6_cyber_activism P12.7_communication
P12.8_meet_new_people P12.9_sell
    P16.1.1_communication_family_friends
  /MISSING LISTWISE
  /ANALYSIS P12.1_work_studies P12.2_infromation_news P12.3_shopping
P12.4_procedures
    P12.5_entertainment P12.6_cyber_activism P12.7_communication
P12.8_meet_new_people P12.9_sell
```

P16.1.1_communication_family_friends

/PRINT INITIAL CORRELATION EXTRACTION ROTATION

/PLOT EIGEN ROTATION

/CRITERIA MINEIGEN(1) ITERATE(25)

/EXTRACTION PC

/CRITERIA ITERATE(25) DELTA(0)

/ROTATION OBLIMIN

/SAVE BART(ALL)

/METHOD=CORRELATION.

****Ordinal Regression Model**

PLUM Internet_perception BY Age Gender Isolation P12.1_work_studies_dummy P12.7_communication_dummy

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/PRINT=CELLINFO FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

PLUM Internet_perception BY Age Gender Isolation P12.1_work_studies_dummy P12.7_communication_dummy

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/PRINT=CELLINFO FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

PLUM Internet_perception BY Age Gender Studies Occupation Isolation P12.1_work_studies_dummy

P12.7_communication_dummy

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/PRINT=CELLINFO FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

PLUM Internet_perception BY Age Gender Studies P12.1_work_studies_dummy P12.7_communication_dummy

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/PRINT=CELLINFO FIT PARAMETER SUMMARY TPARALLEL

/SAVE=ESTPROB.

PLUM Internet_perception BY Age Gender Studies

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

```
  /PRINT=CELLINFO FIT PARAMETER SUMMARY TPARALLEL

  /SAVE=ESTPROB.


PLUM Internet_perception BY Age Gender Studies

  /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6)
SINGULAR(1.0E-8)

  /LINK=LOGIT

  /PRINT=CELLINFO FIT PARAMETER SUMMARY TPARALLEL

  /SAVE=ESTPROB.


PLUM Internet_perception BY Age Gender Studies P12.1_work_studies_dummy
P12.7_communication_dummy

  /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6)
SINGULAR(1.0E-8)

  /LINK=LOGIT

  /PRINT=CELLINFO FIT PARAMETER SUMMARY TPARALLEL.


PLUM Internet_perception BY Age Gender Studies P12.1_work_studies_dummy
P12.7_communication_dummy

    Isolation Occupation

  /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6)
SINGULAR(1.0E-8)

  /LINK=LOGIT

  /PRINT=CELLINFO FIT PARAMETER SUMMARY TPARALLEL.
```

```
CROSSTABS
  /TABLES=Internet_perception_isolation BY P37.1_aislado P37.2_aislado P37.3_aislado
P37.4_aislado
    P37.5_aislado P37.6_aislado P37.7_aislado
  /FORMAT=AVALUE TABLES
  /STATISTICS=CORR
  /CELLS=COUNT ROW
  /COUNT ROUND CELL.

PLUM Internet_perception_isolation BY Age Gender Studies Occupation
  /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6)
SINGULAR(1.0E-8)
  /LINK=LOGIT
  /PRINT=FIT PARAMETER SUMMARY TPARALLEL.

PLUM Internet_perception_isolation BY Age Gender Studies Occupation
P12.1_work_studies_dummy
    P12.7_communication_dummy
  /CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6)
SINGULAR(1.0E-8)
  /LINK=LOGIT
  /PRINT=FIT PARAMETER SUMMARY TPARALLEL.

PLUM Internet_perception_isolation BY Age Gender Occupation
P12.1_work_studies_dummy
```

P12.7_communication_dummy

/CRITERIA=CIN(95) DELTA(0) LCONVERGE(0) MXITER(100) MXSTEP(5) PCONVERGE(1.0E-6) SINGULAR(1.0E-8)

/LINK=LOGIT

/PRINT=FIT PARAMETER SUMMARY TPARALLEL.

*****Multinomial Logictic Regression**

****Model 1**

NOMREG Internet_percep_isol.1 (BASE=LAST ORDER=ASCENDING) BY Gender Age Isolation Level_of_studies

/CRITERIA CIN(95) DELTA(0) MXITER(100) MXSTEP(5) CHKSEP(20) LCONVERGE(0) PCONVERGE(0.000001)

SINGULAR(0.00000001)

/MODEL

/STEPWISE=PIN(.05) POUT(0.1) MINEFFECT(0) RULE(SINGLE) ENTRYMETHOD(LR) REMOVALMETHOD(LR)

/INTERCEPT=INCLUDE

/PRINT=CELLPROB FIT PARAMETER SUMMARY LRT CPS STEP MFI.

RECODE Internet_percep_isol.2 (0=3) (1=2) (2=1) (3=0) (SYSMIS=SYSMIS).

EXECUTE.

****Model 2**

```
NOMREG Internet_percep_isol.2 (BASE=LAST ORDER=ASCENDING) BY Gender Age Isolation
Level_of_studies
  /CRITERIA CIN(95) DELTA(0) MXITER(100) MXSTEP(5) CHKSEP(20) LCONVERGE(0)
PCONVERGE(0.000001)
    SINGULAR(0.00000001)
  /MODEL
  /STEPWISE=PIN(.05) POUT(0.1) MINEFFECT(0) RULE(SINGLE) ENTRYMETHOD(LR)
REMOVALMETHOD(LR)
  /INTERCEPT=INCLUDE
  /PRINT=CELLPROB FIT PARAMETER SUMMARY LRT CPS STEP MFI.
```

R Script

```
install.packages("ggplot2")

library("ggplot2")

library(readxl)

Egonetworks_Analysis_DATA_R <- read_excel("C:/Users/User/Desktop/SOCIAL RESEARCH
METHODS AND STATISTICS/Dissertation/Analysis/Egonetworks Analysis - DATA_R.xlsx")

View(Egonetworks_Analysis_DATA_R)

head(Egonetworks_Analysis_DATA_R)

summary(Egonetworks_Analysis_DATA_R)


### GGPLOTS ###
```

```
########################

### Age(Y) Density(X) - Components ###

########################################

ggplot(data = Egonetworks_Analysis_DATA_R, aes(x = Density, y = Age, colour =
Components))+ geom_point()

### Age(X) Density(Y) - Components ###

########################################

ggplot(data = Egonetworks_Analysis_DATA_R, aes(x = Age, y = Density, colour =
Components))+ geom_point()

### Number of ties(X)  Isolation index(Y) - Components ###

#############################################################

ggplot(data = Egonetworks_Analysis_DATA_R, aes(x = "Ties", y = "Isolation", colour =
Components))+ geom_point()

ggplot(Egonetworks_Analysis_DATA_R, aes("Number of ties", "Isolation index")) +
geom_point(aes(colour = factor(Components)))

ggplot(Egonetworks_Analysis_DATA_R, aes("Number of ties", "Isolation index")) +
geom_point()
```

```
### Number of ties(X)  Age(Y) - Components ###

################################################


ggplot(data = Egonetworks_Analysis_DATA_R, aes(x = "Ties", y = Age, colour =
Components))+ geom_point()

))+ geom_point()


ggplot(data = Egonetworks_Analysis_DATA_R, aes(x = "Ties", y = Age))+ geom_point()

))+ geom_point()


### Number of ties(Y) Age(X) - Components ###

################################################


ggplot(data = Egonetworks_Analysis_DATA_R, aes(x = Age, y = "Number of ties", colour =
Components))+ geom_point()


ggplot(data = Egonetworks_Analysis_DATA_R, aes(x = Age, y = "Number of ties"))+
geom_point()


### Histograms ###

################################################
```

```
ggplot(Egonetworks_Analysis_DATA_R, aes(x = Age)) + geom_histogram() + stat_bin(bins = 10)

ggplot(Egonetworks_Analysis_DATA_R, aes(x = Age)) + geom_histogram() + stat_bin(bins = 30)


ggplot(Egonetworks_Analysis_DATA_R, aes(x = Components)) + geom_histogram() + stat_bin(bins = 10)

ggplot(Egonetworks_Analysis_DATA_R, aes(x = Components)) + geom_histogram() + stat_bin(bins = 30)


######## BOXPLOTS #############

#################################################################


######## BOXPLOT for Age(Y) v/s Factor Components #######

#################################################################


ggplot(data = Egonetworks_Analysis_DATA_R) + geom_boxplot(aes(x=factor(Components), y=Age))


######## BOXPLOT for  Density(Y) v/s Factor Components #######

#################################################################


ggplot(data = Egonetworks_Analysis_DATA_R) + geom_boxplot(aes(x=factor(Components), y=Density))
```

```
###### Other graphs ######

############################


### one ###

############


ggplot(data = Egonetworks_Analysis_DATA_R) +

  geom_bar(mapping = aes(x = Density, fill = Components))


### two ###

############


ggplot(data = Egonetworks_Analysis_DATA_R) +

  geom_bar(mapping = aes(x = Age, fill = Components))


### three ###

#############


ggplot(data = Egonetworks_Analysis_DATA_R) +

  geom_bar(mapping = aes(x = "Number of nodes", fill = Components))


### four ###

#############
```

```
ggplot(data = Egonetworks_Analysis_DATA_R) +
  geom_bar(mapping = aes(x = "Number of ties", fill = Components))


### five ###
#############


ggplot(data = Egonetworks_Analysis_DATA_R) +
  geom_bar(mapping = aes(x = "Isolation index", fill = Components))
```

----------o----------