

# INDIVIDUALISM OR COMPLEMENTARITY? THE EFFECT OF DIGITAL PERSONAL NETWORKS ON FACE-TO-FACE PERSONAL NETWORKS\*

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# **INDIVIDUALISM OR COMPLEMENTARITY? THE EFFECT OF DIGITAL PERSONAL NETWORKS ON FACE-TO-FACE PERSONAL NETWORKS**

## **ABSTRACT**

Information and communication technologies (ICTs) are affecting ways of networking in advanced societies. This study analyzes the interaction of face-to-face social networks and digital social networks in Spain, a Mediterranean country characterized by significant sociability in every social sphere. Our aim is to contrast this with the hypothesis that new forms of networking can lead to isolation or individualization. This study uses two surveys carried out by the *Centro de Investigaciones Sociológicas* [Center for Sociological Research] in 2014 and 2016, involving 4,922 people over 18 years of age who were asked about these two types of networks (face-to-face and digital) and other topics related to demographics, family, social position, and personality traits. The results indicate complementarity between networks: digital networks served to enrich face-to-face networks, especially when people described themselves as extraverted. However, nuances were observed in relation to rural or urban habitat and forms of coexistence among those interviewed.

**KEYWORDS:** social support networks, virtual social networks, sociability, information and communication technologies

**TITLE WORDS:** Effect of digital networks on face-to-face networks

## 1. INTRODUCTION

This article examines the relationship between personal face-to-face and digital personal networks. Research on social structures has traditionally focused on analyzing face-to-face social networks, but with the development of information and communication technologies (ICTs), new scenarios of interaction between digital and face-to-face social structures should be considered. Lee *et al.* (2011) and Hampton *et al.* (2009) have indicated that face-to-face contact is still the dominant method of communication in a person's principal relationships, and this is supplemented through messages via various virtual means (email, instant messaging, and social media).

Internet relationships broaden social experiences in a way that permits people to access much more geographically distant communities than face-to-face relationships alone. The Internet allows for communication among family, friends, co-workers, and even strangers across great spatial and cultural distances. It also facilitates ongoing connectivity and distorts the traditional barriers between public and private spheres (Gardner and Davis, 2013). This form of communication has changed how people connect with each other and can affect every aspect of social life: at work, with family, with friends, or during leisure activities. The effects may strengthen, impoverish, or even diminish communication. The Internet has enormous potential for broadening people's relational experiences (Lee *et al.*, 2011).

As an important transformation agent for social life, the Internet favors social relationships by reinforcing an individual's existing networks and increasing the possibility of communication with others. As a central element in today's society, the Internet generates new relationships but never destroys them. Internauts combine ways of connecting *online* and *offline* and maneuver simultaneously in virtual and face-to-face worlds (Castells *et al.*, 2007).

Abundant studies in many developed countries have examined the reality of face-to-face and digital relationships (Wellman and Haythornthwaite, 2002; Raine and Wellman, 2012). Examples from the United States (Katz and Rice, 2002; Howard, Raine and Jones, 2002), Great Britain (Anderson and Tracey, 2002) and other countries indicate that the Internet strengthens rather than diminishes face-to-face relationships. However, it is important to look more fully into the effects of these interactions on various social groups, the factors they depend on, and their consequences. This study analyzes the

interactions of face-to-face and digital networks in Spain, a country with high face-to-face sociability that is characteristic of Mediterranean cultures (Putnam, 1994).

Interaction models using face-to-face and mediated communication are complex to the point that the terminology has not been entirely agreed upon (for example, the definition of online/offline). The answer people often give as to whether they established a relationship online or offline can also be ambiguous. Our objective is to provide new information regarding the effect of digital networks on face-to-face networks.

## 2. THEORETICAL FRAMEWORK

### 2.1. The process of individualization and the Internet

Today's society is a network society constructed around personal and corporate networks which communicate through digital networks based on the Internet. As such, these networks are global and have no limits (Castells, 1996). The social structure of the current historical moment is the result of real and virtual interactions between the social actors that comprise it. One of its primary traits is the emergence of an important process of individualization. We find ourselves in a society of greater geographical and communicational mobility and intense migration processes that affect the configuration of our personal networks (Lubbers *et al.*, 2010; De Miguel *et al.*, 2015; Requena, 2008). This "egocentric society" is characterized by the decline of community in terms of space, work, family, and affiliation in general. However, this does not signify the end of community or localized interactions, but rather a re-interpretation of relationships to include the solid cultural and personal ties that could be considered a form of community life based on individual interests, values, and projects (Castells, 2013).

Community does not disappear, but is re-defined according to the relationships established by the individual (De Singly, 2003). Individuals have greater control over belonging simultaneously to different groups of their choosing, thanks to the digital contact provided by the Internet.

The process of individualization is the material result of new forms of organizing economic, political, social, and life activities (Castells, 1996; 1997; 1998; 2013), the effects of which were visualized by the classics (Dawson, 2012). It derives from the transformation of space (metropolitan life), economic and work life (appearance of web-based companies and work systems), culture, communications (transition to mass

communication based on the Internet rather than mass media), and the crisis of the traditional family model combined with the growing autonomy of its different members (Castells, 2013).

However, individualization does not mean isolation: people continue to belong to communities (Beilmann and Realo, 2012). Sociability is reconstructed in a context of individualism and web-based communities involving a search for people with affinity, in a process that combines digital (online) with face-to-face (offline) interactions. Through this combination of physical space and cyberspace, online and offline connectivity increases our belonging to a community.<sup>1</sup> This new form of sociability is what Raine and Wellman (2012) have defined as *networked individualism*: a new social structure and culture based on network technologies (Parks, 2011).

## 2.2. The “*connected presence*”: how technology integrates social networks

Communication mediated by technology (from ordinary mail to ICTs) can provide important information relevant to the study of social networks. Since these networks generate the possibility of interpersonal communication, the use of technology helps promote sociability. However, it is also true that personal networks not only configure, but are also configured by technological communication platforms, since they affect the formation of social ties. Licoppe and Smoreda (2005) have described the relationship between social networks (the combination of links that have one or more relational dimensions), exchanges between actors, and the various technological means of communication. These facilitate information and sociability exchanges, allowing people to overcome temporal limitations by re-negotiating who they communicate with, and when. They reduce the importance of the space variable, and even create potential for new ways of constructing identities, resulting in a “more flexible human” (Sennett, 1998). These communication tools provide new resources for negotiating individual schedules and social exchanges, leading to changes in roles, hierarchies, and forms of power in the network society.

The traditional model of communication in which communication technologies were used to connect people who were physically separated is gradually giving way to a new form of “connected presence”. People see each other and send each other messages via

SMS or WhatsApp, for example, along with images, small gestures, or signs of attention that are as important as the actual content of the message.

Sociability comprises all forms of interaction with others, by whatever means, through which it is possible to adjust interpersonal behaviors and the temporal ordering of moments of presence and absence, as well as the rhythms of words, writing, gestures and silence (Licoppe and Smoreda, 2005). It is the flow of exchanges that people maintain with each other. Technologically-mediated communication is restrictive, while simultaneously providing diverse ways of connecting. The “technology of encounters” (Thrift, 2004) refers to how these diverse methods intervene and permit the user to engage in various exchanges and types of interactions.

### 2.3 Online-offline complementarity

Like other communication technologies, communication tools mediated by ICTs, such as email or messaging through SMS or WhatsApp re-define the temporal and spatial limitations of communication. When online communication derives from face-to-face encounters, the directionality is that of online communication resulting from offline encounters. Thus, offline-to-online interaction is part of the nucleus of many online communications (Ellison *et al.*, 2011).

Individuals generally use communication platforms to articulate and reflect their offline social relationships rather than to seek encounters with strangers on social network sites (SNS). Online places such as *MySpace* can be seen as contexts for virtual communities. However, *MySpace*, *Facebook*, and other SNS are not single communities; they function as social spaces in which different communities can be formed. SNS carry inherent expectations of connection with others, sociability, empathy, and support (Parks, 2011). In this sense, virtual communities are not so virtual after all. Even though digitally-mediated communication theoretically liberates individuals from the limitations of physical proximity, it seems that *online* social connections depend on face-to-face interactions (Foucault *et al.*, 2009).

Internet-mediated communication often adapts itself to and reinforces pre-existing groups that were formed in other settings. This fits with Licoppe’s (2004) idea of “connected presence” that strengthens the sense of *us* in opposition to *them*. Ongoing connectivity provides a strong sense of belonging to a group (Ling, 2008), giving rise to

a new sociability pattern in which presence is not simply the opposite of absence. It reveals that ICTs (social media, chats, WhatsApp, smart phones) do not replace face-to-face interactions; they constitute a new resource for constructing “connected presence” even when people are physically distant. In this new dynamic, participants use all available means and artefacts to multiply encounters and contacts, turning relationships into quasi-continuous exchange networks (Licoppe and Smoreda, 2005).

Thus, ICTs should not be seen as a substitute for face-to-face communication. Physical encounters, cards and letters, phone calls, emails, and SMS can all share the same positive value of extending a bridge across seemingly unbearable situations of absence and silence. Thus, the need to affirm one’s connection to another can be satisfied online or face-to-face. The interaction of both networks raises multiple questions that require more comprehensive answers. What type of people are most likely to use these networks? Does use correspond to higher levels of education or social position? Does personality influence disposition towards use of digital networks?

#### 2.4. Hypotheses

The thesis of individualization sustains that modernization will promote freer and more independent, but also more isolated, human beings (Beck *et al.*, 1994). The impact of ICTs alters the ways in which people communicate and form relationships, contributing to the enrichment (complementarity) or the diminishment and loss (individualization) of social networks. Using this as the main hypothesis of our study, we aim to test whether *face-to-face personal networks expand with increased use of digital networks*. Since the effects of digital versus personal networks can vary according to personal, social, and other characteristics, various sub-hypotheses have been formulated:

H1. People who reside in urban settings and are digitally connected also possess larger networks of face-to-face contacts.

H2. People with higher levels of education will have larger face-to-face and digital networks, implying that their digital networks enrich their personal networks.

H3. Couples who do not share lodging and are connected to digital networks will have larger face-to-face networks than couples who cohabit. By not sharing lodging, they

have fewer responsibilities and more free time to invest in their own personal networks (friends, family, co-workers, etc.).

H4. People who identify themselves as more extraverted and who are connected to digital networks have larger networks of face-to-face relationships.

### 3. DATA, VARIABLES AND METHODS

#### 3.1 Data

The data was extracted from Spanish Barometers 3038 and 3128, which were carried out by the *Centro de Investigaciones Sociológicas de España* [Center for Sociological Research of Spain, CIS]<sup>2</sup> in September 2014 and February 2016, respectively. The CIS Barometers are monthly surveys composed of a constant module of questions relating to social structure and a corresponding variable module, which in September 2014 and February 2016 addressed face-to-face and digital social relationships. The Barometers rely on a random national sample representative of the population resident in Spain, which in this analysis involved 4,922 people of both sexes over 18 years of age.<sup>3</sup> The survey was carried out in the households of those interviewed. The confidence margin was 95.5% ( $2\sigma$ ) and the total estimated error was  $\pm 1.4\%$ .

The sampling procedure had several phases, stratified by conglomerates, with selections from the primary sampling units (municipalities) and the secondary units (sections) in a proportionate and random way, and from final units (individuals) based on random routes and gender/age quotas. The demographic characteristics of the survey population coincided with the official population data provided by the Spanish *Instituto Nacional de Estadística* [National Institute of Statistics, INE].

Several of the Barometer questions were related to the face-to-face and digital personal networks of those interviewed, which we have used to design the variables for our analysis.

The following variables were used in the models (see Table 1):

#### 3.2 Dependent variables

The size of face-to-face personal networks was measured based on question 15 of the Barometers:

*Now think about how many people you habitually have contact with on a normal day, including the people you live with. By this we mean the people with whom you have individual face-to-face contact, in other words, those with whom you converse or address different matters in person. Take into account only the people you talk to in person.*

The interviewee answers this question with the number of people with whom they have face-to-face interactions.

### 3.3 Independent variables

#### 3.3.1 Use of digital networks

The variables from CONECT1 to CONECT5 are dummy variables constructed from questions 27 and 32 of the Barometer questionnaires. Question 27 refers to the frequency of use of WhatsApp or other instant messaging systems, while question 32 refers to the frequency of connection to social network sites (SNS). The values of these variables are: CONECT1=1, constantly connected, otherwise=0; CONECT2=1, connected several times a day, otherwise=0; CONECT3=1, connected several times a week, otherwise=0; CONECT4=1, connected less than weekly or almost never, otherwise=0; CONECT5=1, having no virtual networks, otherwise=0. We used the CONECT5 “having no virtual networks” variable as reference for comparison.

#### 3.3.2 Control variables

Control variables were classified into four large groups based on the hypotheses to be analyzed: demographics, social position, family situation, and personality.

The *demographics* variables considered were: female, age intervals, rural (the interviewee lives in population centers of less than 10,000 residents), Semi-urban (in population centers of between 10,001 and 100,000 residents) and Urban (in population centers larger than 100,000 residents). All these were considered dummy variables.

The *social position* variables considered were: educational level (dummy variable): without studies, primary school, secondary school, vocational studies, university undergraduate studies, and university graduate studies. Net monthly income (in euros) of the interviewee after tax deductions was a continuous variable. The activity sector (dummy variable) refers to the sector in which the interviewee works: agriculture,

industry, construction and services. Finally, work status was also used as a dummy variable: employed, retired, unemployed, student, non-remunerated domestic work.

*Family situation* variables were used as dummy variables referring to different coexistence situations: married, single, in a relationship but not sharing lodging, not married but in a relationship and sharing lodging. The number of people living in the residence (continuous variable) was also added to this group.

We introduced scales for measuring basic *personality* traits, based on the consideration that personality can affect the pre-disposition to use face-to-face and/or digital networks. The objective was to control for the degree to which personality types influenced the relationship between face-to-face and digital networks. Thus, we measured relatively stable personality traits that could influence an individual's perceptions, attitudes, and behaviors, using a widely-known model that classifies personality differences into five basic groups (John and Srivastava, 1999; Gosling *et al.*, 2003; Rammstedt and John, 2007): extroversion, agreeableness, conscientiousness, neuroticism, and openness. Specifically, the CIS uses the Rammstedt and John (2007) version.

TABLE 1 ABOUT HERE

### 3.4 *Method*

To verify the hypotheses, we followed the analytic strategy that applies the regression models of Poisson, which used digital networks as an explanatory factor for the dependent variable. We also included the aforementioned control variables in the model. The Poisson regression model best fits our data and analysis because the dependent variable is a 'count variable' that mainly assumes small values.

## 4. RESULTS

### 4.1 *Complementarity between face-to-face and digital personal networks*

Initial findings revealed a positive relationship in the correlation between the size of face-to-face and digital personal networks. However, the strength of this correlation varied according to the level of connectivity.

## Graph 1 ABOUT HERE

The positive effect of digital networks on face-to-face networks can be put into context by examining Table 2, which shows the effects of the use of virtual networks on the size of face-to-face personal networks.

Without considering the effects of the control variables, we can observe that people who were connected several times a week had face-to-face personal networks almost three times (2.85) larger than those who did not use virtual networks, and 1.6 times larger than those who were constantly connected. From this we can confirm that, in general, moderate use of digital networks strengthens face-to-face personal networks.

However, these effects were nuanced when controlled for demographics, social position, family, and personality variables. The effects of digital networks on face-to-face networks showed almost no differences based on gender, with an IRR coefficient very close to one (IRR=.96). Effects did vary with respect to age: people between 18 and 24 years of age generally had smaller face-to-face networks than older age groups. However, of those digitally connected, it is important to point out that the age groups with the most face-to-face relationships were those from 25 to 34 and 45 to 54 years of age (IRR= 1.89 in both cases). These groups had the greatest relational capital.

## TABLE 2 ABOUT HERE

Differences based on income were barely perceptible. However, the effects in semi-urban environments were more positive compared to rural environments. Urban inhabitants who were digitally connected had the fewest face-to-face relationships, which gives cause to reject sub-hypothesis H1.

When we controlled for all the variables described in the most complete model (Eq. 5), we observed that the people who used digital networks sporadically (connected less than once a week or almost never) had the largest face-to-face networks. This also applied to those with an undergraduate university education (IRR=1.44) compared to those without studies. Compared to the rest of the work categories, those who were

retired or stated ‘other’ work situations had larger face-to-face personal networks (IRR=3.11 and IRR=3.19, respectively), followed by those who did domestic work (IRR=1.63). Sub-hypothesis H2 can therefore be accepted. People in a relationship but who did not share lodging had fewer face-to-face personal networks (IRR= .58) than married couples, indicating that Sub-hypothesis H3 can be rejected. With regard to personality, those who identified themselves as extraverted and users of digital networks had the largest face-to-face personal networks (IRR=1.34), which supports acceptance of Sub-hypothesis H4. Table 2 shows that when we controlled for the widest range and combination of variables, the level of significance in the model (Eq. 5) increased considerably (Pseudo R<sup>2</sup>=27.8), allowing us to explain 27.8% of the variance in face-to-face personal networks.

## 5. DISCUSSION AND CONCLUSIONS

This research has contrasted the hypotheses of greater complementarity or individualization of society resulting from the effects of digital networks on face-to-face relationships. We based our study on an original database that made it possible to understand the effects of demographic, family, social status and personality traits on these networks. One of the most important discoveries was that digital communities complement face-to-face relationships.

Our data confirms complementarity between face-to-face and digital networks in Spain and corroborates studies from other countries, such as the United States (Foucault *et al.*, 2009). Along these lines, in studies on the choosing of friends among adolescents, Parks (2011) found that geographically close offline communities frequently led to digital communities on the Internet.

Communication by ‘smart phones’ allows us to maintain social exchanges that were formerly limited to face-to-face interactions (Ling, 2008). This shows that Internet-mediated communication is complementary to our daily interactions with others. Today, communication by mobile phones covers all kinds of daily interactions, from organizing events to coordinating family logistics to exchanging gossip and commentaries.

Wellman *et al.* (2008) reported that in United States households, 33% of users said the Internet had improved their connections with friends “a lot”, and 23% stated that the quality of their family communications had also improved. Almost half (49%) of those

between 18 and 29 years of age stated that the Internet had improved their personal connections with friends.

Understanding the interaction between personal and digital networks in a country like Spain, where face-to-face networks are significant, is very important. The Spanish social structure is characterized by high sociability, which explains many other cultural traits, such as high quality of life, strong family ties or the paradoxically lower level of social trust than in Anglo-Saxon countries. Mediterranean sociability may be altered by the development of new ICTs and the fact that Spain leads Europe in the number of smart phones per person (World Bank, 2015), which facilitate this type of communication.

This study refutes the thesis of greater isolationism based on the proliferation of ICTs and corroborates studies in other developed countries indicating that digital networks complement and strengthen face-to-face relationships, but do not replace them. This suggests that the proliferation of digital networks does not result in greater individualization, at least not directly.

These results are coherent with those of Dunbar *et al.* (2015), who analyzed several data sets for online and offline relationships. Their results corroborate our findings: the data showed extremely similar proportions for the different groups identified in online and face-to-face (offline) relationships.

Prior studies (Boase *et al.*, 2006; Lee *et al.*, 2011) have shown that Internet users tend to communicate more with people they have already met before than with strangers. For example, Leung (2001) demonstrated that Internet users communicated most with classmates, friends, and family members, and least with anonymous contacts.

We have shown that in Spain, face-to-face and digital relationships function in a complimentary way, as in many Western countries where research has been able to test this. We observed a positive effect between Internet use and the intensity of face-to-face sociability. More sociable and extraverted people generally used the Internet more, and online and offline sociability increased with more frequent use of the Internet. Raine and Wellman (2012) have described important benefits stemming from enhanced offline and online relationships, such as increased civic responsibility and more intense connections with family and friends.

However, this study also provides interesting nuances that open the door to future research. First, the finding that inhabitants of urban areas who are ‘connected’ to digital networks have the fewest face-to-face relationships invites reflection. New urban lifestyles may entail the impoverishment of face-to-face networks, so future studies would need to look at what types of networks are most affected (relatives, friends, co-workers, etc.) and the potential consequences.

Similarly, this study examined the effects of these networks by looking at ‘couples’ and cohabitation situations. The fact that people who were ‘connected’ and in a relationship but did not share lodging had fewer face-to-face personal networks than married couples also invites future study. Until now, people *living apart together* (LAT) have generally corresponded to a profile of younger people with university studies, medium to high income, and greater independence to manage their friends and free time (Stoilova *et al.*, 2014). Our findings question the hypothesis that LAT facilitates a life that is richer in face-to-face relationships.

Digital social networks are living environments that connect all dimensions of an individual’s personal experience. People share experiences both in a face-to-face and a digital way. Paradoxically, digital social life is equally or more social than physical life, which has been individualized by work organization, city life, or new family structures. With the current variety of direct and Internet-mediated communication channels, people have at their disposition different ways of adjusting the flow of relationships and can choose the channel – WhatsApp versus phone calls, for example – that is most appropriate for each type of content.

With this study, we confirm the complementarity of face-to-face and digital networks. The Internet neither isolates people nor reduces their sociability, but actually increases it (Raine and Wellman, 2012; Castells, 2013). Thus, digital networks are closely related to face-to-face networks. Offline and online relationships already form part of people’s daily lives; they are not separate worlds, but a single, real, and hybrid world composed of both digital and face-to-face components. We have shown that a Mediterranean country such as Spain behaves similarly to more culturally Anglo-Saxon countries with regard to the complementarity of offline and online relationships.

However, there are certain limitations to this study. First, despite the qualitative importance of this analysis, the variables related to different frequencies of connectivity

to digital personal networks explained only a relatively small percentage of the variance in the size of face-to-face networks (0.7%). Secondly, no international survey program (ISSP, WVS, ESS, etc.) has asked jointly about face-to-face and digital personal networks, so we have no precise international comparisons on the effects of digital networks on face-to-face networks. Only tentative comparative analyses can be carried out based on methodologically diverse independent studies done in specific countries. Exact and precise comparison based on standardized questions and samples is not yet possible. This is undoubtedly a challenge that must be addressed in the future. Likewise, it is important recognize the potential of analyzing the complementarity between face-to-face and digital networks. They are not mutually exclusive; rather, they generate a relational model of ‘adaptable sociability’ based on the relational needs of individuals who remain constantly connected with contacts near and far through face-to-face and/or digital networks.

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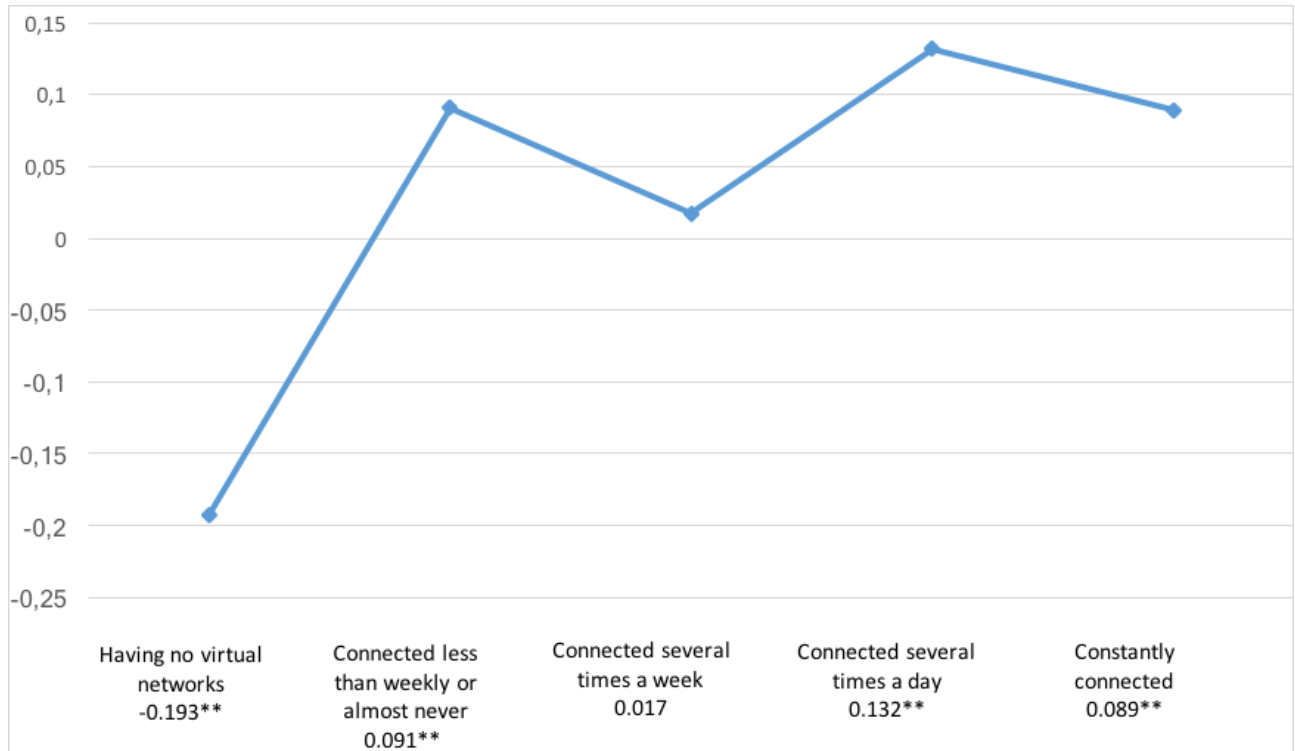
<sup>1</sup> Technologically-mediated sociability is not new. It has adapted throughout the centuries to transformations in the factors that mediate interpersonal relations. In the sixteenth century, the exchange of gifts between peers, nobles, and scholars helped them to maintain contact. In the nineteenth century, bourgeois correspondence had this same function. Letters mitigated the absence of the other person, providing news and indicating presence. Historically, mediated communication has complimented face-to-face relationships (Licoppe and Smoreda, 2005).

<sup>2</sup> The complete technical aspects of the survey are available on the website of the *Centro de Investigaciones Sociológicas*: [http://www.cis.es/cis/export/sites/default/-Archivos/Marginales/3020\\_3039/3038/FT3038.pdf](http://www.cis.es/cis/export/sites/default/-Archivos/Marginales/3020_3039/3038/FT3038.pdf) and [http://www.cis.es/cis/export/sites/default/-Archivos/Marginales/3120\\_3139/3128/FT3128.pdf](http://www.cis.es/cis/export/sites/default/-Archivos/Marginales/3120_3139/3128/FT3128.pdf)

<sup>3</sup> The samples of each Barometer were: N=2,444 for September 2014 and N=2,478 for February 2016. Since the Barometers were used together, the total sample was N=4,922 people and the total error for least unfavourable case was  $\pm 1.4\%$ .

### Graph 1

Correlation coefficients between the number of people with face-to-face relationships and the frequency of connection to digital networks



Level of significance: \*\* 0.01 (bilateral); \* 0.05 (bilateral)

Source: CIS: Barometer no. 3038 (Sept. 2014) and no. 3128 (Feb. 2016)

**Table 2**

**Poisson Regression Analyses of the effects of virtual networks and socio-demographic and personality traits on face-to-face networks.**

Independent Variables	Eq.1		Eq.2		Eq.3		Eq.4		Eq.5	
	IRR	95% CI	IRR	95% CI	IRR	95% CI	IRR	95% CI	IRR	95% CI
<i>*How often virtual networks are used (dummy)</i>										
Does not have virtual networks CONNECT5 (reference)										
Connected less than weekly or almost never CONNECT4	1.41***	1.27-1.56	1.18**	1.06-1.30	.51***	.40-.66	.50***	.39-.66	3.77***	2.41-5.88
Connected several times a week CONNECT3	2.85***	2.70-3.02	2.43***	2.29-2.57	.59***	.51-.69	.59***	.51-.68	.39***	.29-.53
Connected several times a day CONNECT2	.84***	.83-.86	.68***	.67-.70	.70***	.68-.72	.71***	.69-.73	.31***	.30-.33
Constantly connected CONNECT1	1.25***	1.23-1.27	1.04**	1.02-1.07	1.00	.97-1.03	1.04**	1.01-1.08	.50***	.48-.54
<b>Control variables</b>										
<i>*Demographics</i>										
Female (dummy)			.96***	.95-.98	.89***	.87-.91	.87***	.86-.89	.91***	.88-.94
Age intervals (dummy)										
18-24 (reference)										
25-34			1.89***	1.83-1.96	1.29***	1.23-1.34	1.28***	1.23-1.34	1.20***	1.13-1.27
35-44			1.25***	1.21-1.30	.93**	.89-.97	.90***	.86-.94	.46***	.43-.50
45-54			1.89***	1.83-1.96	1.45***	1.39-1.52	1.42***	1.36-1.49	.75***	.70-.80
55 and older			1.09***	1.05-1.13	.56***	.53-.59	.56***	.53-.60	.06***	.05-.06
Rural/urban (dummy)										
Rural less than 10,000 (reference)										
Semi-urban 10,001 to 100,000			1.02**	1.01-1.04	1.22***	1.19-1.25	1.21***	1.19-1.24	1.25***	1.21-1.30
Urban more than 100,000			.74***	.73-.76	.84***	.82-.86	.84***	.82-.86	.60***	.57-.62
<i>*Social position</i>										
Education by educational levels (dummy)										

Without studies (reference)										
Primary Education					1.75***	1.68-1.82	1.77***	1.70-1.84	.93*	.88-.99
Secondary Education					1.68***	1.61-1.75	1.68***	1.61-1.76	.77***	.72-.82
Vocational Studies					1.80***	1.72-1.89	1.80***	1.72-1.89	.47***	.44-.50
University Undergraduate Studies					2.64***	2.50-2.77	2.69***	2.55-2.83	1.44***	1.33-1.56
Graduate Studies					1.87***	1.77-1.97	1.92***	1.82-2.03	.67***	.62-.74
Monthly income of interviewees					1.00***	1.00-1.00	1.00***	1.00-1.00	1.00***	1.00-1.00
Activity Sector (dummy)										
Agriculture (reference)										
Industry					2.28***	2.19-2.37	2.33***	2.24-2.43	1.85***	1.76-1.97
Construction					1.72***	1.64-1.79	1.73***	1.65-1.80	1.64***	1.54-1.74
Services					1.68***	1.61-1.74	1.69***	1.63-1.76	1.36***	1.29-1.43
Work Situation (dummy)										
Employed (reference)										
Retired or pensioned					1.06**	1.02-1.09	1.05**	1.02-1.09	3.11***	2.91-3.31
Unemployed					.43***	.42-.44	.42***	.41-.43	.48***	.45-.50
Student					.37***	.35-.40	.38***	.36-.41	.39***	.35-.43
Non-remunerated domestic work					1.10***	1.06-1.15	1.09***	1.05-1.14	1.63***	1.52-1.75
Other work situation					.46**	.28-.77	.45**	.27-.76	3.19***	1.80-5.67
<i>*Family situation</i>										
Number of people living in the household							1.03***	1.03-1.03	1.05***	1.04-1.06
Cohabitation situation (dummy)										
Married (reference)										
Single							1.04***	1.02-1.07	.82***	.79-.85
In a relationship but not cohabitating							.78***	.75-.81	.58***	.54-.61
Unmarried but in a relationship and cohabitating							.99	.96-1.02	.83***	.79-.87
<i>*Personality</i>										
neuroticism									.97***	.96-.98
extroverted									1.34***	1.33-1.35
agreeableness									.94***	.93-.95
conscientiousness									.92***	.91-.93
Openness									.95***	.94-.96
Constant	33.17***	32.89-33.46	30.30***	29.17-31.48	19.22***	17.94-20.59	17.85***	16.58-19.22	73.10***	64.37-82.95
Pseudo R2		.007		.030		.080		.081		.278
Chi2		2255.17		8973.83		15446.51		15948.42		22290.11
Log Likelihood		-157453.78		-154094.45		-91618.82		-91053.28		-28938.63
N		2,555		2,555		1,946		1,922		710

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IRR=Incidence Rate Ratio. 95% CI=95% Confidence Interval. Level of significance: \*\*\*p<0.001; \*\*p<0.01; \*p<0.05  
Source: CIS: Barometer no. 3038 (Sept. 2014) and no. 3128 (Feb. 2016)

**Table 1****Descriptive statistics of variables in the regression models**

	N	Min	Max	Mean	Standard dev.
<b>Independent Variables</b>					
<i>*How often virtual networks are used (dummy)</i>					
Does not have virtual networks CONNECT5	2555	0.00	1.00	.6008	.48983
Connected less than weekly or almost never CONNECT4	2555	0.00	1.00	.0031	.05588
Connected several times a week CONNECT3	2555	0.00	1.00	.0051	.07116
Connected several times a day CONNECT2	2555	0.00	1.00	.2552	.43605
Constantly connected CONNECT1	2555	0.00	1.00	.1358	.34266
<b>Control variables</b>					
<i>*Demographics</i>					
Female (dummy)	4922	0.00	1.00	.5148	.49983
Age intervals (dummy)					
age 18-24	4922	.00	1.00	.0847	.27850
age 25-34	4922	.00	1.00	.1587	.36541
age 35-44	4922	.00	1.00	.1977	.39829
age 45-54	4922	.00	1.00	.1841	.38758
age 55 and older	4922	.00	1.00	.3748	.48413
Rural/urban (dummy)					
Rural less than 10000	4922	0.00	1.00	.3881	.48736
Semi-urban 10001 to 100000	4922	0.00	1.00	.3941	.48872
Urban more than 100000	4922	0.00	1.00	.5148	.49983
<i>*Social position</i>					
Educational level (dummy)					
Without studies	4914	.00	1.00	.0600	.23757
Primary Education	4914	.00	1.00	.1750	.38001
Secondary Education	4914	.00	1.00	.3826	.48607
Vocational Studies	4914	.00	1.00	.1764	.38123
University Undergraduate Studies	4914	.00	1.00	.0867	.28141
Graduate Studies	4914	.00	1.00	.1193	.32412
Monthly income of interviewees	3797	0.00	7000.00	779.6387	748.08703
Activity Sector (dummy)					
Agriculture	4835	0.00	1.00	.0759	.26487
Industry	4835	0.00	1.00	.1663	.37238
Construction	4835	0.00	1.00	.1011	.30154
Services	4835	0.00	1.00	.6567	.47487
Labor Situation (dummy)					
Employed	4913	0.00	1.00	.4024	.49043
Retired or pensioner	4913	0.00	1.00	.2502	.43314
Unemployed	4913	0.00	1.00	.2243	.41716
Student	4913	0.00	1.00	.0462	.20995
Non-remunerated domestic work	4913	0.00	1.00	.0757	.26457
Other labor situation	4913	0.00	1.00	.0012	.03493
<i>*Familial situation</i>					
Number of people living in the household	4915	1	14	2.90	1.277
Cohabitation situation (dummy)					
Married	4845	0.00	1.00	.2528	.43468
Single	4845	0.00	1.00	.0912	.28796

In a relationship but not cohabitating	4845	0.00	1.00	.1146	.31851
Unmarried but in a relationship and cohabitating	4915	1	14	2.90	1.277
<i>*Personality</i>					
neuroticism	3931	0.00	8.00	3.1994	2.19678
extroversion	3958	0.00	8.00	4.9192	1.95360
agreeableness	3642	0.00	8.00	5.7271	1.58671
conscientiousness	4833	0.00	8.00	6.2744	1.73826
openness	3003	0.00	8.00	4.6973	2.02218
<b>Dependent variable</b>					
<b>Size of face-to-face networks:</b>	4836	0	300	16.16	22.517

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Source: CIS: Barometers 3038 (Sept. 2014) and 3128 (Feb. 2016)