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EXPLAINING COMMUNICATION DISPLACEMENT AND LARGE-SCALE SOCIAL CHANGE IN CORE NETWORKS:

A CROSS-NATIONAL COMPARISON OF WHY BIGGER IS NOT BETTER AND LESS CAN MEAN MORE

Keith N. Hampton
School of Communication & Information
Rutgers University
4 Huntington Street, New Brunswick, NJ 08901-1071
Phone: (732) 932-7500 x8108
Email: keith.hampton@rutgers.edu

Richard Ling
IT University of Copenhagen
Rued Langgaards Vej 7
DK-2300 Copenhagen S
Email: rili@itu.dk

Keith N. Hampton is an associate professor in the Department of Communication in the School of Communication & Information at Rutgers. He received his Ph.D. and M.A. in sociology from the University of Toronto and a B.A. in sociology from the University of Calgary. His research interests focus on the relationship between new information and communication technologies, social networks, and the urban environment.

Richard Ling is a professor at the IT University of Copenhagen, Denmark and a sociologist at the Telenor research institute located near Oslo, Norway. He received his Ph.D. in sociology from the University of Colorado, Boulder in his native United States. His work involves researching issues that are associated with new information communication technology and society, with a particular focus on mobile telephony.

Abstract

Decline in the size and diversity of American's core networks has been tied to the displacement of face-to-face interaction and to lower societal well-being. Comparing core networks in the United States, Norway, and Ukraine, we reject the conclusions that frequent in-person contact predicts individual well-being and that large/diverse networks predict broader societal well-being. Individuals of lower socioeconomic status and societies with lower levels of overall prosperity have higher rates of in-person contact. Internet use is associated with higher in-person contact for the socioeconomically advantaged but lower rates of in-person contact for the disadvantaged. In-person and ICT-based contact is generally associated with maintaining a larger network, but in societies of lower well-being frequent interaction impedes the ability to maintain a large network. In contrast to the positive relationship between individual socioeconomic status and network size, societal prosperity has a negative relationship to network size. Findings are discussed in relation to social support, democratic engagement, and the digital divide.

Keywords: media multiplexity, computer-mediated communication, social media, social presence, media richness, civic society, social isolation

Explaining Communication Displacement and Large-Scale Social Change in Core Networks: A Cross-national Comparison of Why Bigger is Not Better and Less Can Mean More

Introduction

Is bigger better? Recent research on the structure of affiliation implies that size does matter, that something has been lost in terms of individual and societal well-being as a result of a historical decline in the size and diversity of the average American's core network (McPherson et al. 2006, Hampton et al. 2011c). This decline in core networks has corresponded with the rise of many new information and communication technologies (ICTs), including the Internet and the mobile phone. Scholars argue that ICTs displace both face-to-face contact and the number of close connections (McPherson et al. 2006, Olds and Schwartz 2009, Turkle 2011). Researchers also argue that the displacement of core ties and in-person contact is tied to a series of negative social outcomes, i.e., shallow deliberation, less social support, and low civic society (McPherson et al. 2006, Fishkin 2000, Gibson 2001). This perspective overly simplifies the relationship between interaction, core networks, and displacement. It fails to consider variation in individual or societal context. We suggest a modified displacement theory and provide evidence from cross-national surveys to reject four assumptions: 1) large and diverse core networks are associated with societal prosperity; 2) higher levels of individual and societal well-being predict higher levels of face-to-face contact, 3) most people have less face-to-face contact when mediated communication is used with core confidants; and 4) for most people, the use of ICTs within core networks displaces core confidants.

Studies of the recent trend toward smaller and less diverse core networks have been limited in their reliance on a series of repeated cross-sectional surveys of American adults

(McPherson et al. 2006, Brashears 2011, Hampton et al. 2011c). A cross-national comparison of core networks and media use provides a new perspective on this trend. By comparing the United States, Norway, and Ukraine, we explore the relationship between face-to-face contact and ICT use and how frequency of contact by medium is related to core network size and diversity. We make the following arguments:

- Concerns that low societal well-being is associated with smaller and less diverse core networks should be discounted. Arguments in favor of this position are based on an ecological fallacy that assumes that the positive relationship between individual well-being and core network size can be generalized to the societal level. This generalization is false; it ignores a *network paradox*. Unlike at the individual level, societal prosperity is negatively related to network size.
- For most people, frequent ICT use within core networks is associated with frequent face-to-face contact. However, as a result of an *affordance paradox*, there is an exception based on individual inequality. In the absence of new communication technologies, the most disadvantaged, individuals of lower socioeconomic status, have higher face-to-face contact with core ties. In this context, face-to-face contact is lower with ICT use.
- Social contact, in-person communication, and the use of ICTs support larger core networks. However, there is a *contact paradox* whereby, in a context of lower societal well-being, frequent contact with core networks, face-to-face and otherwise, impedes the ability to maintain a larger core network.

Core Networks

Scholars estimate that the average American has a social network of approximately 1,700 people (Killworth et al. 1990) that consists of about 600 active ties (DiPrete et al. 2011, Hampton

et al. 2011a), a more intimate circle of approximately 150 close ties (Hill and Dunbar 2003), and, within that, even deeper layers of intimacy. The core network is the small, innermost layer within a person's social network. It is quite literally "the core."

Core ties tend to be high in trust and shared norms; they are highly homophilious in terms of attitudes and behaviors and provide broad social support (McPherson et al. 2001). In particular, core ties are a good source of emotional, instrumental, and emergency aid (Wellman and Wortley 1990).

Core networks are also a source of deliberation (Huckfeldt 2007). They serve as discussion partners for topics that range from politics to relationships to the obscure (Bearman and Parigi 2004). The more diverse a core network, the greater the potential for cross-cutting political discussion within the core (Huckfeldt 2007). This argument has been generalized to the societal level. Gibson (2001) argued that countries where people have larger core networks – particularly core networks that extend beyond family relations - are indicative of a healthy civic society.

The size of the core varies by individual characteristics, by society, and by how it is measured (Killworth et al. 1990). The most common tool used to measure core networks is the personal network name generator (Marin and Hampton 2007). Name generators ask participants one or a series of questions that elicit a list of network alters. One of the most commonly used generators asks participants: "From time to time, most people discuss important matters with other people. Looking back over the last six months – who are the people with whom you discussed matters that are important to you?" The "important matters" name generator has been used extensively. Studies using this question from the United States (McPherson et al. 2006), the United Kingdom (Bennett et al. 2000), China (Ruan 1998), Russia, France, Poland, Spain,

Bulgaria, and Hungary (Gibson 2001) have consistently found core networks that range, at the societal level, in mean size from a little less than two to about four alters.

Using the "important matters" name generator, recent studies by McPherson et al. (2006), Hampton et al. (2011c, 2011a), and Brashears (2011) have found that core networks in the United States are substantively smaller and less diverse than they were two decades earlier. Compared to data collected in 1985 (Marsden 1987), core networks have dropped in size from an average of three to two alters. The diversity of core ties (operationalized as having anyone in the core network who is non-kin [Marsden 1987]) has also declined. In 1985 approximately 64% of American adults reported discussing an important matter with someone outside of their family; by 2008, this number had dropped to 45% (Hampton et al. 2011c).

Speculation about the cause of the large-scale change in American's core networks has focused primarily on two possibilities. The first is measurement error in the 2004 General Social Survey (GSS) (Fischer 2009), which was the first data source used to suggest a decline in American core networks (McPherson et al. 2006). The second is a historical correspondence between the decline in core networks and the rise of the Internet and mobile phone (McPherson et al. 2006). However, neither of these possibilities has revealed a clear explanation.

An evaluation of the 2004 GSS did reveal a small amount of miscoded data (some missing cases were coded as zero core ties), but a reanalysis had little effect on the original findings (McPherson et al. 2009). An additional analysis of the 2004 GSS and a series of methodological experiments that were included in the 2010 GSS suggest that interviewer effects may have been responsible for an inflated estimate of Americans who reported no one with whom they could discuss important matters (Paik and Sanchagrin 2012, Fischer 2012). However, an error in the number of Americans who reported no core ties does not substantively effect the

mean network size reported in the 2004 GSS (McPherson et al. 2009). In addition, three subsequent replications of the " important matters" network question on nationally representative samples of Americans found average network sizes and distributions that closely mimic the 2004 GSS data (minus the spike in the number of people with no core ties). This supports the conclusion that American core networks are indeed smaller and less diverse today than they were two decades earlier (Brashears 2011, Hampton et al. 2011c, Hampton et al. 2011a).

The second explanation, the "displacement hypothesis," argues that mediated communication has replaced face-to-face contact (Nie 2001, Olds and Schwartz 2009), and that this replacement displaces core ties (McPherson et al. 2006). However, this explanation is also in doubt, because recent studies of core ties have uncovered neutral to positive relationships between different types of mobile phone and Internet use and core network size and diversity (Hampton et al. 2011c, Hampton et al. 2011a).

The existing empirical evidence does not support measurement error or the displacement hypotheses as explanations for the decline in core networks. In addition, the underlying logic that drives these explanations – that the movement toward a smaller number of core ties is a sudden, large-scale, social change and indicative of lower societal well-being – is problematic. We present an alternative theory that suggests that smaller core networks are a predictable corollary to societal prosperity, and that the displacement of face-to-face contact and core ties as a result of ICTs is limited to very specific contexts.

The Ecology of Size and Contact

Arguments that larger and more diverse core networks are indicative of healthy and prosperous individuals and societies make clear why a societal trend toward smaller and more kin-centric core networks might be discerning. However, although individual measures of

prosperity, such as socioeconomic status, have consistently been found to predict individual network size (Campbell et al. 1986), we argue that it is an ecological fallacy to generalize these findings to the societal level.

Defining societal well-being, or prosperity is a contested area of study. From an economics perspective, well-being is traditionally measured as gross domestic product (GDP), but alternative social and economic development paradigms emphasize the role of the state and civic institutions (Helliwell 2002, Tolbert et al. 1998). We don't attempt to settle this debate here, but accept that well-being is likely to consist of some combination of economic wealth, a social safety net, and the presence of a strong civic society. What these measures have in common is recognition that resources provided by the market, state, and civic society support the well-being of a society.

Network studies of societies where formal resources are scarce find that the informal resources exchanged with core ties substitute for the formal market (Sik and Wellman 1999, Espinoza 1999, Ling et al. forthcoming). Indeed, core networks are a well-known source of instrumental and emergency aid. When economic resources are low, when there is a minimal government safety net (e.g., welfare), and civic society is absent, the demand for resources that flow through core networks is high. In places where charitable and community groups, the state, and the market institutionalize support, there is also less need for day-to-day resources to flow from the cohesive bonds that make up an individual's core network.

In a society where formal resources are limited, a large core network with frequent contact – face-to-face and otherwise – is a necessity to obtain adequate informal support. Thus, we hypothesize that in societies (i.e., countries) of lower overall prosperity, there will be larger core networks (H1) and more frequent face-to-face contact within those networks (H2).

However, although a large core network may be optimal when formal resources are scarce, the demands of frequent contact are also likely to limit network size. Therefore, in a context of low societal well-being, those with more frequent contact – face-to-face or through other media – will tend to have smaller core networks (H3). In a societal context where formal resources are more abundant, we expect core networks to be smaller. Where societies are prosperous, frequent contact is unlikely to further limit network size. Thus, we hypothesize that in this context, frequency of contact is neutral to positive in its relationship to network size (H4).

In core networks, issues of size cannot be divorced from issues of diversity. Evidence from previous, large-scale societal transitions suggests that kinship relations tend to be the most enduring ties (Laslett 1965). As a result of shared living (core ties often include spouses and children), if societal prosperity contributes to attrition within what is already a small network of ties, it is likely to result in the loss of nonkin over immediate family. Thus, we hypothesize that higher levels of societal prosperity are associated with core networks that are more concentrated in kinship relations (H5).

Individual Affordances of ICTs

We view frequency of communication to be directly connected to the demands that are placed on core networks. In a societal context in which demands on core ties are high, we hypothesized that contact should also be high. This should also be true at the individual level. Individuals with fewer resources and a lower socioeconomic status (SES) are likely to need more informal support from core networks members than those with access to more formal resources. The tendency for those of lower SES to have smaller core networks is likely to compound this. Thus, we hypothesize that individuals who have a lower SES tend to have higher rates of face-to-face contact with core ties than those with a higher SES (H6).

Haythornthwaite's (2005) theory of media multiplexity argues that core ties are likely to use multiple media in tie maintenance because of the frequency of contact and the breadth of support that passes through these relations. Consistent with this theory, in core networks, contact through one medium tends to be positively associated with contact through others. This reinforces rather than displaces core ties and face-to-face contact (Boase et al. 2006). However, we depart from the theory of media multiplexity by assuming that ICTs supplement rather than replace face-to-face contact in all contexts. We argue that displacement is likely in some contexts, but disagree with traditional displacement theory, which assumes that such displacement is necessarily problematic.

Media theorists have long argued that the introduction of new ICTs changes the spatial and temporal constraints on communication (Castells 1996). Rainie and Wellman (2012) and others suggest that new ICTs - particularly the mobile phone – make social ties accessible almost anytime and anywhere. If ICT use reduces the time and resource costs of core tie maintenance, ICT use may displace some face-to-face contact, but at the same time it provides an immediacy of contact that was previously unavailable. In the context of the strong ties that characterize core networks, the theory of media multiplexity views displacement as unlikely, but we anticipate that displacement is stratified by socioeconomic status. Compared to mediated forms of contact, face-to-face contact is expensive in terms of time and the resources to coordinate interaction. As a result, a mediated alternative to face-to-face contact is likely to aid the informal exchange of resources for those in most regular need of core ties for informal support – those of lower SES. Consistent with the theory of media multiplexity, we hypothesize that for individuals of higher SES, contact through ICTs is likely to be associated with higher rates of face-to-face contact

(H7). However, consistent with our modified displacement hypothesis, the use of ICTs is associated with lower levels of face-to-face contact for those with a lower SES (H8).

Not all ICTs should be expected to afford similar outcomes related to core networks. Although we do not explicitly differentiate between ICTs in the hypotheses we have stated thus far, we apply a general principal: ICTs need to be pervasive in their use before they are likely to influence social structure. This is consistent with theories about the adoption of interactive media and the role of network externalities or network effects (Markus 1987). Only those ICTs that are used extensively in the maintenance of core ties are likely to influence core network size. In the United States, this would exclude technologies that are not used extensively in communicating with core ties, such as social networking services (SNS) (e.g., Facebook) and instant messaging (IM) (Hampton et al. 2009). A variety of factors are likely to influence the extent to which different ICTs have been adopted across countries; we do not detail them here. However, we would expect that as individuals ICTs are diffused and adopted pervasively within core networks, their effects will become apparent as we have hypothesized above.

In predicting core network diversity, we anticipate variation by ICTs, based on factors other than universal access. Ishii (2006) and others have found that whereas technologies, such as email, support broad, distant social ties, other technologies, such as the mobile phone, tend to be more supportive of local, intimate ties. If the mobile phone deepens a limited set of relations at the expense of more diverse ties (Gergen 2008), and given that the mobile is also often used to access and coordinate family resources (Ling 2012), we hypothesize that voice contact through mobile phone use reinforces, or at the least, positively correlates with the trend toward kin-centric core networks (H9). This is unlike other technologies, such as email, which may help preserve or even reinforce ties that are outside of the home – nonkin (H10).

Methods

This study is based on a cross-national comparison of core discussion networks in the United States, Norway, and Ukraine. Survey data on core networks, based on nationally representative samples, is rare and notoriously difficult to collect; the approach is particularly time consuming and demanding of participants (Marin and Hampton 2007, Fischer 2009). The datasets used in this analysis were not collected as part of a coordinated effort but were part of two, independent, research projects. Despite the uncoordinated efforts in data collection, the selection of countries and common questions provided an unprecedented opportunity for a cross-national comparison.

Although there is no consensus on how societal well-being should be measured (Helliwell 2002), we suggest that it is related to economic wealth, a social safety net, and the presence of a strong civic society. The three countries in this study provide a clear contrast among these indicators. The United States and Norway have among the highest gross domestic product per capita (World Bank 2009) and both have strong civic societies (Salamon and Sokolowski 2004). In contrast, gross domestic product per capita for Ukraine is relatively low, and its civic society is typically regarded as weak (Howard 2003). Norway and the United States fall on opposite ends of a welfare continuum on which Norway provide a very extensive public safety net and the United States a more modest approach (Ferragina and Seeleib-Kaiser 2011). In Ukraine, an extreme reduction in state resources has marked the post-Soviet era and left “many Ukrainians with nearly non-existent social safety nets” so that by 2004, “the lack of social protection in Ukraine was staggering” (Romaniuk 2009). The United Nations Development Program’s Human Development Index, an alternative measure of well-being, provides an indication of construct validity. The Human Development Index considers economic,

institutional, and social factors in ranking Norway first, the United States thirteenth, and Ukraine eighty-fifth among countries (United Nations Development Program 2009).

This study is based on data that were collected in 2008. As in other studies of core networks, the “important matters” name generator was administered to participants in all three countries. Participants were asked: “From time to time, most people discuss important matters with other people. Looking back over the last six months, who are the people with whom you discussed matters that are important to you?” In response, participants could list as many names as they wanted, but, consistent with other studies, a maximum of five names were recorded (0-5). Participants were asked the frequency at which they interacted in-person with each network member by using a landline telephone, speaking on a mobile phone, by text messaging using a mobile phone, by email, by instant messaging, and by using social networking services such as Facebook (days/month; 1-30). Participants also indicated their connection to each core tie, e.g., spouse, child, sibling, neighbor, co-worker, or friend.

The U.S. data were collected in July and August 2008 as part of a survey conducted by the Pew Internet & American Life Project. Interviewees consisted of 2,512 adults living in households in the continental United States who used a combination of landline (2,007 interviews) and mobile phone (505 interviews) samples (cooperation rate = 32%; response rate = 22%). A two-stage procedure was used to weight this dual-frame sample. A first-stage weight accounted for dual-users (landline and mobile phone) included in both sample frames, and a second-stage weight balanced sample demographics to population parameters. The sample was balanced to match national population parameters for sex, age, education, race, Hispanic origin, region, population density, and telephone usage.

The Norwegian and Ukrainian surveys were conducted from September to December 2008 by the Telenor Group (a Norwegian-based telecommunications company). In Norway, the survey was conducted in Norwegian as a Web-based survey that used an established panel that is representative of the Norwegian population. The 2008 survey was part of a two-wave longitudinal study that began in 2007. The original Norwegian survey had a response rate of 45.1%. In 2008, 1,357 participants (a 64.5% retention rate) completed the second wave of the survey that is analyzed in this study. The original panel included Norwegians who were fifteen years of age and older, but this study includes only the 1,340 surveys completed in 2008 by those who were eighteen years of age or older.

In Ukraine, the survey was conducted in Ukrainian as part of a face-to-face interview. Like the Norwegian sample, the 2008 survey was part of an established longitudinal panel survey. The original Ukrainian sample from 2007 included 1,028 persons who were fifteen years and older (a 76.9% response rate); the 2008 survey included 572 of the original respondents (a 55% retention rate) and a new sample of 401 additional participants. The analysis in this study is based on the 928 survey participants from 2008 who were eighteen years of age or older. Although the Norwegian and Ukrainian samples were obtained from panels that had been designed to be nationally representative, additional weights were added to balance the sample demographics to known national population parameters for sex and age.

Consistent with previous studies that have used the “important matters” name generator, we interpret network size as a measure of a participant’s core network of strong, highly clustered, close ties (McPherson et al. 2006). We follow prior work in defining diversity by focusing on the kin/nonkin composition of the network (Marsden 1987, McPherson et al. 2006, Gibson 2001), operationalized as “immediate kin” (spouse, parent, child, sibling) and “other”

(neighbor, coworker, friend, and other). This distinction is based on the rationale that core network members tend to be highly homophilous, but that kin are likely to be more similar across a range of measures pertaining to attitudes and opinions than are nonkin (McPherson et al. 2001).

Hierarchical linear modeling (HLM) is used to model the relationship between the dependent variable, number of days/month of face-to-face interaction with individual core confidants, and predictors based on participant's personal characteristics, core network size, network composition, and days/month of contact by other media. HLM is the preferred approach because it avoids the problem of aggregating the characteristics of core confidants (alter-level characteristics). We control for participant variables collected in common across all three surveys: age (18-99), sex, marital status (married or cohabitating), years of education (4-16), and employment status (employed full-time or not). In the absence of a reliable measure of individual income, we use years of education as a proxy for socioeconomic status. Although we recognize that race and ethnicity might be important points of variation in network structure, we lacked a comparable measure for them across all three datasets. Given the unique role that women play in the maintenance of core networks and the possible variation in this role by country and in women's use of different media, we control for the participant's sex to predict frequency of face-to-face contact based on kinship status and by medium of communication. Based on the work of Kalmijn (2003), who suggests that marriage is likely to substantively influence interaction with kin, we control for possible variation in cohabitation rates within countries by using a variable for marriage/cohabitation to predict face-to-face interaction with immediate kin. Recognizing that network size may influence interaction with kin in a different way than with nonkin, and that

this too may vary by country, we include an additional control for network size when predicting face-to-face interaction with immediate kin.

HLM cannot be utilized to model dependent variables that are on the ego or network level of analysis. Our dependent variables for network size and diversity are count data (0-5). Therefore, Poisson and negative binomial regression are used to predict size and diversity for participants in each country. For each analysis, STATA is used to generate both a Poisson and a negative binomial model. Poisson was the preferred model except in those cases in which the dispersion parameter (alpha) indicated overdispersion; in such cases, the negative binomial model was adopted. The use of unnested data requires the use of aggregate measures of communication in these models: mean days/month of contact for each medium (0-30). We control for age, sex, marital status, years of education, and employment status. In addition, we introduce a control for age-squared to account for the possibility that the relationship between network size and age is curvilinear.

Findings

What is the Relationship between Core Network Size and Diversity and Societal Well-Being?

Table 1 provides a comparison of core network size and diversity in the United States, Norway, and Ukraine. The United States has the lowest mean and model core ($\bar{x}$=1.9), followed closely by Norway ($\bar{x}$=2.6), and then Ukraine ($\bar{x}$=3.8). Social isolation (no core ties) is moderately higher in Norway (15.4%) than in the United States (12.0%), and few Ukrainians report that they have no core confidants (1.1%). In the United States, the distribution of network members has a positive skew; most have one or two core ties. In Ukraine, there is a negative skew; most have four or more ties. In Norway, the distribution, although positively skewed, is

slightly flatter than in the United States. Core confidants outside of the immediate family are much more prevalent in Ukraine (75.9%) than they are in Norway (58.4%), or the United States (50.7%). Consistent with our hypotheses, a negative relationship exists between societal well-being and core network size (H1) and diversity (H5).

How is Societal Well-Being Related to Frequency of In-Person Contact?

As outlined in Table 2, face-to-face contact remains the most pervasive and frequent mode of social interaction in all three countries. Nearly all members of our three samples use in-person contact to maintain core ties (those who have no core ties have no interaction of any type). The mobile phone is consistently the second most pervasive and frequent medium of communication across countries. Following face-to-face contact and the use of a mobile phone, there is considerable cross-country variation in the use of mediated forms of interaction within core networks. The traditional land-line telephone is the third most pervasive medium in the United States and Ukraine, but fifth in Norway. Texting is the third most popular mode of contact in Norway, nearly equivalent in frequency of use to mobile phones , but it is fourth in popularity in the Ukraine and fifth in the United States. Computer-mediated forms of communication are largely absent within Ukrainian core networks, and, with the exception of email, they consistently rank near the bottom in terms of frequency and popularity in the United States and Norway. Only in Norway are instant messaging or social networking services used at what might be considered a moderate level of activity in the maintenance of core networks.

As anticipated, in a society with lower levels of well-being, people tend to have more frequent face-to-face contact (H2). The average number of face-to-face encounters per network member is substantially higher in Ukraine (19.2 days/month). Although significantly different,

in-person contact is only moderately higher in the United States (14.3 days/month) than in Norway (11.8 days/month).

How is Individual Well-Being Related to Frequency of In-Person Contact?

Based on our HLM model in Table 3, we find that those with lower levels of education (lower socioeconomic status) have more frequent face-to-face interaction with core network members. This finding is consistent across countries and supports our hypothesis that individuals of lower SES have higher rates of face-to-face contact with core ties (H6). For example, in the United States, holding other variables constant, a person with four years of post-secondary education (an undergraduate degree) has face-to-face contact with each core tie 1.8 fewer days/month in comparison to someone with a high school diploma. The negative relationship between face-to-face contact and education is more pronounced in Norway and even more so in the Ukraine.

Evidence in support of our hypotheses that individuals of higher SES experience higher rates of in-person contact with ICT use (H7), and that ICT use is associated with lower in-person contact for those of lower SES (H8) is less consistent. As expected, the relationship is absent for ICTs that are not pervasive within core networks, but the relationship is also absent among some more pervasive ICTs.

In line with the theory of media multiplexity, as originally proposed by Haythornthwaite (2005), mobile phone use has a consistent, positive relationship with frequency of in-person contact. There is no variation in this relationship by years of education. Holding other factors constant, for every two days that a Norwegian has voice contact with a core confidant by mobile phone, he/she sees that same person face-to-face 1.1 additional day.[1]

The relationship between mobile phone use and in-person contact is not as pronounced in the United States, and there is variation by gender. Again, there is no variation in this relationship by SES. An American male who talks to a core confidant on a mobile phone on ten days in a month is likely to see that same core tie on 2.9 additional days/month compared to someone with whom he has no interaction using a mobile. For American women, the relationship is about half: ten days of mobile phone contact is associated with face-to-face contact on 1.7 additional days.

Thus, for the U.S. and Norway, there is a positive relationship between mobile phone use and in-person contact that does not vary by SES as we had anticipated. It may be that the relative absence of a mobile digital divide in the United States and Norway limits variation by SES (Smith 2010, Brown et al. 2011). However, in Ukraine, we do find that those with more years of education experience higher rates of face-to-face contact with higher rates of mobile use (H7). A person with 16 years of formal education in Ukraine who does not use a mobile phone averages 4.2 fewer day of face-to-face contact with each core tie, in comparison to a similar person who is in contact with core ties using a mobile phone on ten days/month. A person with 12 years of education, who does not use a mobile phone, averages 3.1 fewer days of face-to-face contact in comparison to someone who uses a mobile phone with core ties on 10 days/month. However, because of the negative relationship between SES and face-to-face contact (H6), the mobile phone user with the equivalent of a high school education would still average 3.6 more days of face-t-face contact/month with each core tie when compared to the mobile user with a university degree (16 years of education).

We do not find the expected relationship between socioeconomic status, in-person contact, and use of a landline telephone, as per our modified displacement hypothesis (H8).

Where a relationship exists between the use of a landline telephone and face-to-face contact, it is positive, but there is no variation by SES. In the United States, contact by landline telephone, which is used nearly as pervasively as the mobile phone, has a similar relationship to face-to-face contact as mobile phone use, with no variation by sex (about 3 additional days of face-to-face for every ten days of landline contact). Whereas 71.9% of Norwegians report that they use a fixed telephone in the maintenance of their core networks, there is no relationship to face-to-face contact. However, the landline may appear more pervasive in Norway than it really is. Norwegians may limit landline use to specific exchanges or specific core ties. Landline ownership is in decline nationwide, to a point that it cannot be considered pervasive – down from 51.1/100 people in 2002 (about the current level in the United States – also in decline) to 39.8/100 in 2008 (World Bank 2009). In Norway, the mobile phone may more or less completely replace the landline phone as a channel for communication with core ties.

As in Norway, the landline phone has relatively low penetration in Ukraine; it is not universal, and slightly more than half of Ukrainians use the landline phone with any core ties (Table 2). Thus, we anticipate no relationship to face-to-face contact. Given the low level of use of instant messaging and social networking services in the maintenance of core ties, neither is expected, or found to be associated with higher or lower rates of face-to-face contact in any country.

Email is the only ICT other than the phone that was found to have a positive relationship to face-to-face interaction, and only where it is used pervasively within core networks: the United States and Norway. Consistent with our modified displacement hypothesis, there is variation based on SES. Those with the highest levels of education have more frequent face-to-face contact with core ties with whom they email (H7). However, men and women in the United

States and men in Norway with less than the median level of education (the median level in Norway is fourteen years; in the United States it is thirteen years) tend to have less face-to-face contact the more they email (H8). In Norway, this relationship is true only for women with fewer than eleven years of education. Again, this is complicated by the finding that those with higher levels of educational attainment tend to have less face-to-face contact with members of their core network, regardless of their use of ICTs (H6). Controlling for other factors, a person in the United States with a grade nine education who emails a core tie on ten days/month has about 1.6 *fewer* days/month of face-to-face contact with that tie than someone who does not use email. This compares to someone with a four-year university degree who emails a core tie ten days/month and has about 1.4 *additional* days/month of face-to-face contact.

Texting with core network members was the only medium of communication found to have a negative relationship with face-to-face interaction that was not tied to socioeconomic status. This was true only in Norway and only for women. Text messaging (texting/SMS) on a mobile phone is used by 43% of Ukrainians and 33% of American adults in the maintenance of core networks. This level of penetration was not sufficient to find a relationship to face-to-face contact. This contrasts with Norway, where 83% use text messaging with core ties. Women who use text messaging with a core network member on ten days of the month are likely to see that network member one less time per month in comparison to men who text, or those who do not text at all to communicate with core ties. That Norwegian woman who text core ties have less face-to-face contact was an unexpected result. We do not know whether this is unique to Norway (because text messaging with core ties is not used pervasively among adult women in core networks in the United States or the Ukraine) or if there is something unique about texting. This could be considered limited evidence in support of the traditional theory of displacement.

However, this finding is also counter to the trend for Norwegian women who email; they have more face-to-face contact than comparable men. Since the rate of emailing and the rate of texting are positively correlated, texting may actually balance the rate of face-to-face contact as a result of email use by Norwegian women.

What is the Relationship between Frequency of Communication and Core Network Size?

The regressions in Table 4 model the relationship between use of different media and core network size and composition. This analysis tests the hypotheses that social contact is generally neural or positive in its relations to core network size within a society of higher well-being (H4) but is negative in relation to network size within a society of lower well-being (H3).

In Norway, frequency of face-to-face contact is associated with a larger core network; there was no relationship for any form of mediated communication. The relationship for in-person contact is absent in the United States, however, frequent texting and email contact with core ties were positively associated with network size. Compared to the average American (who sends approximately four text messages to each core network member per month), a person who is one standard deviation (SD) above the mean in their use of texting (they average approximately thirteen text messages per confidant/month) has a network that is only 4% larger. Email is associated with a similar difference in the number of core ties. The relationship is only substantive if heavy users are considered relative to nonusers. Americans who are one standard deviation above the mean for both email and texting maintain core networks that average 14% more core ties than nonusers. These findings are consistent with our hypotheses that social contact in societies of higher well-being is neutral or positively associated with core network size (H4).

As anticipated, in the context of lower societal well-being, frequent contact – mediated and in-person – predicts a smaller core network (H3). In Ukraine, there is a negative relationship between face-to-face contact and texting and network size. Compared to the average Ukrainian citizen, Ukrainians who have face-to-face contact with core ties at a rate of one SD above the mean (equivalent to daily contact) tend to have core networks that are 6% smaller. The difference in core network size, when comparing an average of four text messages to each core network member/month, to someone who sends nearly twelve (one SD higher), is about 5% fewer ties. There is no relationship between frequency of mobile phone use for talking and network size. There is a negative relationship for use of IM, but it should not be interpreted as substantive. Few Ukrainians (3.2%) use IM to communicate with core network members. Although it is interesting that those who use social networking services are able to maintain larger core networks, this trend is also based on the very small population (2.0%) of Ukrainians who use social networking services to maintain core networks.

What is the Relationship between Frequency of Communication and Network Diversity?

The relationship between face-to-face contact and network composition is inconsistent across countries (Table 4). Compared with someone who has average in-person contact with their core network, an American who is one standard deviation above the mean in-person contact (26 days of face-to-face) averages 12% more immediate kin. This is the opposite of what we find in Ukraine: frequent face-to-face contact is associated with having fewer core kin. We also found that frequency of in-person contact in Norway is associated with a larger number of nonkin ties.

Consistent with our hypotheses, voice contact by mobile phone has a consistent positive association with core networks that have more immediate kin (H9). In Norway and Ukraine voice contact by mobile phone is also associated with a smaller number of nonkin core ties. For

Norwegians, those who were in mobile phone contact with core network members on eighteen days per month – one standard deviation above the mean – average 13% more immediate kin in their core networks than those with average mobile phone contact (ten days per month).

In the United States, instant messaging within core networks is associated with having fewer ties that are immediate family. Yet, unlike email and mobile phone use, which are nearly ubiquitous modes of contact, only a fraction of the U.S. population (15.4%) uses IM to maintain core networks. In Ukraine, texting, used between 43.1% of core ties, is associated with having fewer core kin.

As anticipated, given the low levels of penetration, other than mobile phone voice, we found no relationship between frequency of ICT use and the number of nonkin in the core networks of Ukrainians. However, we find some support in the U.S. and Norway for the hypothesis that ICT use (other than mobile phone use for talking) is associated with maintaining a core network with a higher number of nonkin (H10). Among Americans, frequency of texting is associated with a larger number of core ties who are not immediate kin. In Norway, the number of core network members who are not immediate family is higher among those who use email and those who use social networking services. (Although the use of social networking services is more pervasive within core networks of Norwegians than in the other countries we studied, at 31.8% of ties, it is hardly universal.) Compared to those who do not use email, Norwegians who are one standard deviation above average (about nine emails per month/core tie) have networks with 19% more network members who are not immediate kin. Compared to those who do not use social networking services, Norwegians who are one standard deviation above average (approximately six interactions using social networking services per core tie/month) tend to have networks of nonkin confidants that are 13% larger. Compared to

someone who does not use email or social networking services, when combined, the influence of these media for a heavy user (one who is one standard deviation above the mean) is equivalent to 34% additional non-kin ties.

Discussion

Findings provide initial support for our theories that pertain to network size, diversity, displacement, and interaction, although at times they were more nuanced and less generalizable across ICTs than we anticipated. Table 5 restates our hypotheses and summarizes our findings.

As expected, we found that societies with higher measures of well-being have comparatively smaller and more kincentric core networks. The argument, that we should expect societies of higher prosperity to have larger and more diverse core networks is based on an ecological fallacy. There is a *network paradox*, individuals of higher SES tend to have larger and more diverse core networks, but this does not extend to the relationship between core network size and societal prosperity. Based on our three-country comparison, societal well-being is negatively associated with network size (H1).

We found higher rates of face-to-face contact in a societal context of lower prosperity (H2). However, there is a *contact paradox*: when social well-being is low, tie displacement results from frequent face-to-face contact and frequent use of some ICTs (H3). We anticipated that we would find a negative relationship between network size and all pervasive ICTs, but in Ukraine, this relationship was present only for texting, and other pervasive ICTs were neutral. In societies of high overall well-being, the use of ICTs with core ties was found to be a neutral or positive in association with core network size (H4). The relationship was positive for face-to-face in Norway and text messages and email in America. Other forms of social contact were neutral.

As hypothesized, kinship ties were more prominent in societies of higher well-being (H5). We expect that this is related to the enduring importance of kin within a network that becomes increasingly parsimonious with decreasing dependence on informal resources. As hypothesized, some channels of mediated communication reinforce this trend. The mobile phone was the best example; it was consistently cross-nationally associated with maintaining a larger core network of kinship relations (H9). The evidence that other ICTs are positively associated with maintaining nonkin ties is less consistent. It is present for texting in the U.S. and for email in Norway but absent for other pervasive ICTs (H10).

There is little support for a broad displacement hypothesis. As we anticipated, it is more nuanced. Higher well-being at the individual level was found to be associated with less frequent face-to-face contact with core ties (H6). This finding was consistent across all three of the countries in our study. We anticipated that pervasive ICT use within core networks of high SES individuals would be associated with higher rates of in-person contact (H7) and that the relationship would be negative among those of lower SES (H8). What we found was consistent with Haythornthwaite's (2005) theory of media multiplexity: that many ICTs had a consistent positive relationship with face-to-face contact regardless of SES. This was true for mobile phone use in Norway and in the U.S. and for landline phone use in the U.S. In Ukraine, mobile phone use had a positive relationship with in-person contact that increased with education. Only for text messaging and only for Norwegian women did we find any evidence of ICT use displacing face-to-face contact. Our hypothesis, a modified displacement hypothesis, was supported in the U.S. and Norway, but only for email use. When email is used within core networks, it only predicts higher face-to-face contact when not used in a context of disadvantage. These findings add an unusual wrinkle to the digital divide and represent what we have termed an *affordance paradox*.

Face-to-face contact is displaced when email is adopted for use within core networks among those of lower socioeconomic status, whereas the opposite is experienced by those of higher socioeconomic status. Those with a socioeconomic advantage tend to be “disadvantaged” in terms of frequency of face-to-face contact with core ties – they have less face-to-face interaction. When compared to those with lower education levels, the socioeconomically advantaged receive a “boost” in face-to-face contact as a result of their use of email. Those who are disadvantaged socioeconomically experience a “blow” to already high levels of face-to-face contact. This trend can be interpreted in two ways.

If we side with theories that privilege face-to-face contact and treat it as an ideal for communication with core ties, then we are witnessing more than a traditional digital divide; it is a widening of the divide. The “haves” gain while the “have nots” experience a loss. However, our findings place doubt on the belief that maximum in-person contact is the best strategy for maintaining core networks. Social presence is costly. In a social context of lower well-being (e.g., Ukraine), high levels of face-to-face contact limit network size. It is possible that we are not witnessing a widening of a social network divide, but a reduction in inequality. Email use among those of lower socioeconomic status may increase the efficiency of communication within core networks, reducing face-to-face contact, but increasing overall access to support. (Other research has found a positive relationship between the use of various ICTs and access to overall support; particularly companionship and emotional aid (Hampton et al. 2011a).) This may allow for a reinvestment in other activities, including building a broader network of weak ties. We do not measure weak ties here and thus do not have the data to confirm this possibility. However, we suspect that for most people, too much time spent within the core reduces the resources they can use to maintain ties at the periphery. Because the most diversity and most

unique resources come from beyond the core (Burt 2001), this, in turn, limits the breadth of unique resources at their disposal.

Limitations

There are limitations to the generalizability of a cross-national comparison that is based on only three countries. A larger number of countries would provide additional contrasts and increase the reliability of our findings. However, given the difficulty associated with the collection of representative, national survey data and in administering the "important matters" core network question, adding additional countries to our analysis would have been prohibitive.

Like all studies that attempt comparative work across cultures, certain challenges arise that may influence the validity and generalizability of findings. There is unknown variation in the translation and interpretation of the key "important matters" name generator across cultures. The issue of translation exists in all cross-cultural survey research. It no doubt applies here, although there is an established history of the translation and use of the "important matters" question for cross-national research (Gibson 2001, Hlebec et al. 2011).

Contextual effects related to question placement and survey administration have the potential to influence the "important matters" name generator (Paik and Sanchagrin 2012). Indeed, this is true for all survey questions and is amplified in a cross-national context, in particular one that utilizes various survey methodologies. However, necessity drove the choice of methodologies – face-to-face, phone, and Web surveys. The use of alternatives would have prevented the undertaking of the study; fixed telephone penetration is too low in Ukraine and Norway for telephone-based interviews, and representative face-to-face interviews are too costly in the United States and Norway. How variation in sample recruitment or response rate influenced key variables is unknown. However, the nearly identical distribution of the U.S. data

collected over the telephone to data collected in-person as part of the 2004 GSS reduces concerns about variation in our findings as a result of contextual effects, response rate, and interview approaches.[2]

Our conclusions would also benefit from a direct analysis of the resources that were exchanged within core networks. Our theory of network and affordance paradoxes rests on the assumption that in societies of higher well-being, individuals obtain more instrumental support from the market, state, and civic society than in societies of lower prosperity, but that emotional support flows at similar levels. Although we assume that the replacement of high levels of in-person contact with email among those of low SES does not negatively affect access to resources, we lack a direct test of these theories. Despite these limitations, this analysis offers a new perspective on an ongoing debate about the structure of affiliation and the role of ICTs. Our cross-cultural approach adds insight that is not available from the repeated cross-sectional analyses that have, until now, been the sole source of comparison in this important discussion (McPherson et al. 2006, Brashears 2011, Hampton et al. 2011c, Hampton et al. 2011a).

Conclusion

Although we do not test it directly, we assume that our theory as to why core networks are smaller and more kincentric in societies of relative prosperity is applicable not only between societies, but within societies over time. The core social networks of Americans are smaller and less diverse than they were twenty years ago because American society is relatively prosperous and formal resources are relatively abundant, and not because there is less overall support.[3] The decline in American core networks was likely not as sudden as has been previously argued. Change, such as what has been observed in the United States over the past twenty years, happens slowly. We suspect that it results from natural attrition within core networks: a combination of

reduced tie replacement and generational change. Younger cohorts likely never built core networks that were as large as with previous cohorts. As older generations have aged, they likely feel less pressure to replace core ties that are lost due to death and changes in friendship. For these reasons, we doubt that the size of core networks as they were measured in the 2004 GSS should be considered the apex of American core networks (Marsden 1987). The size and diversity of core network has likely been in a long, slow decline with the relative increase in societal prosperity.

Smaller core networks in societies like the United States and Norway should be considered an acceptable norm – a sign of the relative availability of formal resources from the market, state, and civic society. Although we did not directly measure support, we reject the notion that smaller, less diverse core networks are indicative of less accessible support. Much depends on context. Communication efficiencies and the institutionalization of support explain the affordance of smaller core networks as well as or better than alternative hypotheses that argue a loss of community, social cohesion, or democratic engagement. We specifically place doubt on arguments that favor the "bigger-networks-are-better" position when predicting deliberative democracy or a strong civic society; in fact, the relationship is likely the reverse.

The argument in favor of the "bigger-is-better" position suggests that large and diverse core networks are more supportive of democratic deliberation and democracy broadly. Yet, core networks are not formed with the intention of political deliberation (Wyatt et al. 2000); they are formed to provide everyday support (Wellman and Wortley 1990). Looking beyond their role in deliberation, core ties have an inconsistent and relatively minor relationship to many other forms of democratic engagement. The size and diversity of core networks are less substantial and consistent predictors of democratic behaviors than overall network diversity (core + periphery)

(Hampton 2011). It is very likely that the efficiencies of mediated forms of interaction increase opportunities to maintain a larger and more diverse periphery. In fact, there is evidence to suggest that the use of ICTs is associated with increased levels of participation in traditional social settings (e.g., voluntary groups, public spaces, etc.), which are, in turn, related to more diverse overall social networks (Hampton et al. 2011b). This is likely to do more for democratic engagement than maintaining a very small number of additional core network members.

However, a societal trend toward smaller and less diverse core networks is not without risks. We have argued that where formal resources are most abundant, small, parsimonious networks provide the necessary, informal support for routine situations. However, in nonroutine situations, a failure in institutionalized support, or in the infrastructure for ICTs, may result in negative, even catastrophic consequences. A failure on the part of government or civic society to provide rapid access to formal support during a crisis – such as was the case in 2005 during Hurricane Katrina – places pressure on limited informal sources of support, and that support may be quickly exhausted. This is probably true in all societal contexts, but it may be amplified in a context in which the need for informal support is generally assumed to be low. A failure in the technological infrastructure that provides access to core ties may have as great as or even more negative consequences for the provision of support, especially in the critical time period before formal resources have been mobilized. These risks are clearest for those who have the smallest and least diverse core networks - the very poor.

American’s core networks may be smaller and less diverse than they were two decades earlier, but we place little weight on arguments that suggest that this is an indication that things have gotten worse, or will get worse for individuals or society as a whole. Such conclusions are based on fallacious arguments that privilege certain types of contact – face-to-face interaction

and large, diverse core networks – while ignoring variation in the context where networks are maintained.

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Table 1. Size of discussion networks, number of immediate kin, and other ties in 2008 (%)

	Total Network[a]			Immediate Kin[a]			Non-Kin[a]		
Size	UKR	NOR	USA	UKR	NOR	USA	UKR	NOR	USA
0	1.1	15.4	12.0	12.0	26.0	35.4	24.1	41.6	49.3
1	5.1	12.1	34.9	19.1	28.2	39.9	23.5	26.8	32.0
2	16.6	21.5	23.1	30.7	25.5	21.1	26.7	19.9	12.6
3	17.7	21.2	15.4	24.9	13.7	8.9	15.5	8.4	4.3
4	11.2	9.8	7.8	11.0	4.9	3.2	7.4	2.3	1.5
5	48.4	20.1	6.8	2.4	1.7	0.4	2.8	1.0	0.3
Mean	3.78	2.58	1.93	2.11	1.48	0.93	1.67	1.06	0.78
Mode	5.00	2.00	1.00	2.00	1.00	1.00	2.00	0.00	0.00
SD	1.38	1.68	1.38	1.25	1.24	0.85	1.34	1.15	0.96

N = UKR (928); NOR (1,345); USA (2,192)
[a] Ad hoc z-test for proportions was calculated for size=0, and a Student's t-test for means, comparing each country all comparisons $p < 0.01$.

Table 2: Mean days/month and standard deviation for interaction by medium and percent who use specific media to interact with core ties

	Ukraine			Norway			United States		
	Mean	SD	%	Mean	SD	%	Mean	SD	%
In-person[a]	19.20	9.54	97.70	11.77	9.56	84.30	14.30	11.86	87.30
Telephone	5.11	7.76	53.70	4.31	6.47	71.90	6.79	10.05	62.10
Mobile	16.27	11.16	82.80	9.64	8.71	83.90	11.23	12.14	68.60
Texting	3.96	7.60	43.10	8.80	8.35	82.80	4.10	8.52	33.40
Email	0.25	1.57	4.90	3.45	5.53	77.70	3.67	7.45	49.20
IM	0.24	1.78	3.20	1.98	5.03	40.30	1.26	4.95	15.4%
SNS	0.10	1.12	2.00	1.36	4.34	31.80	0.64	3.30	12.7%

N = UKR (928); NOR (1,345); USA (2,192).
[a] For in-person contact, an ad hoc Student's t-test was calculated to compare means, all comparisons $p < 0.01$.

Table 3: Number of days in face-to-face contact per month; HLM

	UKR	NOR	USA
Intercept			
Intercept	38.714***	10.947***	16.658***
Network size	-1.485***	0.189	-0.929***
Female	-0.370	-0.876	-0.835
Age	-0.078***	-0.001	-0.020
Married	-0.678	0.682	0.777
Employed fulltime	2.07***	0.338	0.232
Education	-1.155***	-0.521**	-0.456*
Immediate kin (Slope)			
Intercept	-8.127*	4.108	1.068
Network size	0.493	-1.219***	-0.371
Female	0.339	0.025	0.777
Married	0.940	4.351***	2.040*
Education	0.496*	-0.074	0.044
Mobile phone (slope)			
Intercept	-0.107	0.574**	0.293**
Female	-0.031	0.009	-0.120**
Education	0.026*	-0.001	0.009
Texting (slope)			
Intercept	-0.160	0.118	0.021
Female	0.014	-0.098*	0.083
Education	0.013	0.000	0.002
Telephone (slope)			
Intercept	-0.118	-0.129	0.270*
Female	-0.052	0.024	0.017
Education	0.014	0.011	-0.005
Email (slope)			
Intercept	2.653	-0.552*	-0.548*
Female	-0.278	0.141*	-0.084
Education	-0.172	0.039*	0.043**
Instant messaging (slope)			
Intercept	-1.054	0.432	0.057
Female	0.183	-0.120	0.036
Education	0.055	-0.031	-0.003
Social net services (SNS) (slope)			
Intercept	-2.308	0.195	0.514
Female	0.318	0.041	0.040
Education	0.152	-0.017	-0.041
Inter-class correlation (null)	36.02***	8.12***	15.79***
Total R-squared	12.65***	36.12***	24.45***
Level 1 R-squared (alter)	7.15***	36.40***	22.05***
Level 2 R-squared (ego)	22.40***	32.98***	37.30***

N = UKR (level 1: 918, level 2: 3,522); NOR (level 1: 1,136, level 2: 3,464); USA (level 1: 1,896, level 2: 4,247).

*p < 0.05, **p < 0.01, *** p<0.001.

Table 4. Size and diversity of core discussion networks, controlling for demographics and media use; Poisson or negative binomial regression (incidence rate)

	Total Network			Immediate Kin			Non-Kin		
	UKR[1]	NOR	USA	UKR	NOR	USA	UKR	NOR	USA
Age	1.00	1.00	1.01	1.00	0.99	1.01*	1.00	1.02	1.00
Age-squared	1.00	1.00	1.00*	1.00	1.00	1.00*	1.00	1.00	1.00
Education	1.00	1.06***	1.05***	1.00	1.04***	1.01	1.00	1.07***	1.05**
Married	1.04	0.85***	1.00	1.56***	1.20**	1.40	0.67***	0.54***	0.87*
Female	1.01	1.13***	1.12***	1.06	1.23***	1.11**	0.96	1.05	1.23***
Fulltime	1.10**	0.92	0.95	0.99	0.93	0.93	1.24***	0.92	0.91
Face-to-face	0.99***	1.01***	1.00	0.99**	1.01***	1.01***	1.00	1.01*	1.00
Mobile phone	1.00	1.00	1.00	1.01**	1.01***	1.01***	0.99**	0.99**	1.00
Texting	0.99***	1.00	1.01**	0.99***	1.00	1.00	1.00	1.01	1.01*
Telephone	1.00	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.00
Email	1.01	1.00	1.01***	1.00	1.00	1.00	1.01	1.02***	1.01
Instant Messaging	0.98*	1.00	1.00	0.99	1.00	0.99*	0.98	1.00	1.01
Social net services	1.02**	1.00	1.00	1.02	0.99	1.01	1.02	1.02*	1.00
Constant	4.67***	1.07	0.79	1.77**	0.60*	0.36***	2.96***	0.42**	0.39***
Alpha	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.09**	0.19***

[1] For Ukraine, the small number of zeros prevented convergence of a simple Poisson or negative binomial model. Zeros were recoded as one, and a zero-truncated model was used.
N = UKR (928); NOR (1,340); USA (2,148).
*p < 0.05, **p < 0.01, *** p<0.001.

Table 5. Hypotheses

H1	In a society with lower overall well-being, people tend to have larger core networks.	Supported
H2	In a society with lower levels of well-being, people have more frequent face-to-face contact with core network members.	Supported
H3	In a society with lower well-being, frequent contact, communication in-person and otherwise is associated with smaller core networks.	Supported
H4	In societies with higher levels of well-being, frequent contact has a neutral to positive relationship to core network size.	Supported
H5	In societies with higher levels of well-being, core networks are more concentrated in kinship relations.	Supported
H6	Individuals who have lower socioeconomic status have higher rates of face-to-face contact with core ties.	Supported
H7	For individuals of higher socioeconomic status, contact using ICTs is associated with higher rates of face-to-face contact.	Supported for email only
H8	For individuals of lower socioeconomic status, contact using ICTs is associated with lower levels of face-to-face contact.	Supported for email only
H9	Voice contact using the mobile phone is positively associated with a larger number of kin in core networks.	Supported
H10	Contacts within core networks using ICTs, other than voice over mobile phone, is positively associated with the number of nonkin ties.	Supported for limited ICTs; neutral for most

[1] We interpret the direction of the relationship here and elsewhere in this paper as ICT use resulting in more or less in-person contact. However, we stress that our data are cross-sectional and that, although we argue in favor of this interpretation, we cannot conclusively demonstrate the direction of this relationship.

[2] In the 2004 GSS, there was also no zero-order difference in the percentage of respondents who reported having no discussion confidants when in-person and telephone interviews were compared (Fischer 2009).

[3] A recent replication of the core network "important matters" question on a large, representative number of American adults suggests that the first two years of the Great Recession may have been met with a small increase in core network size (Hampton et al. 2011a).