



The Effects of Cell Phone Use on Social Capital Formation



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Abstract

Cell phones are the most widely spread communication technology in the modern day. Previous research into the effects of cell phone use has primarily focused on the individual-level, such as texting while driving, leaving a gap in our understanding of the technology's effects on larger social processes. One such process that cell phones may affect is social capital, or the networks of assistance which exist in our lives, along with the associated norms of trust and reciprocity therein (Putnam, 2000). Recent trends in both social capital and the development and use of cell phones suggests that there may be negative effects from cell phone use when it comes to the formation of social capital in the first place. This study utilizes an experimental design (and both quantitative and qualitative methods of data collection) to understand the effects of cell phone use on the formation of social capital among group members during a group task.

The results from this study indicate that there is an overall negative impact of cell phones use on the formation of social capital, with differences in the types and degrees of interactions, and feelings of trust and reciprocity occurring in the presence and absence of cell phone use. This study has implications for both theoretical understandings and future empirical endeavors, and offers insight as to the effects of cell phones on daily life and the ways in which technology impacts our social world.

Introduction/Literature Review

Cell phones are used on a daily basis by a vast majority (>91%) of the U.S. population (and a growing number worldwide), making them the most widely spread, and fastest spreading, communication technology in history (Rainie & Wellman, 2012; Rainie, 2013; Degusta, 2012).

Along with the rise in cell phone use (and other technologies such as computers and the Internet), we have also seen a general decrease in social capital in the United States, related to increased potentials for individualism (Putnam, 2000).

Social capital, the "connections among individuals-social networks, and the norms of reciprocity and trustworthiness that arise from them" (Putnam, 2000, p. 19), plays an important role in the formation of community and support systems for individuals in society (Coleman, 1990; de Tocqueville, 1966; Bellah, et al., 1996).

Social capital is formed in the interactions we have with one another on a daily basis, especially when calling upon others for aid: "the more extensively persons call on one another for aid, the greater will be the quantity of social capital generated" (Coleman, 1990, p. 321).

Prior research suggests that cell phone use may have positive effects on the maintenance of existing interpersonal networks, in which social capital is realized (Campbell & Kwak, 2011; Julsrud & Bakke, 2009; Miyata, Boase & Wellman, 2008; Wei & Lo, 2006; Chan, 2013).

However, when it comes to the formation of new and diverse network connections, cell phones may play a more limiting role via a reduction of interactions in daily life (Ling, 2008; Turkle, 2011, Geser, 2005).

Previous studies also suggest that the presence of cell phones during interpersonal interactions reduces the perceived quality of conversations, a factor which plays a major role in the development of social capital (Przybylski & Weinstein, 2013; Misra, Cheng, Genevieve & Yuan, 2014; Cross & Borgatti, 2004; Van den Hooff, De Ridder & Aukema, 2004).

If cell phones have a negative impact on the formation of new network connections, it is possible that the strength and scope of social capital may be effected by the use of cell phones.

Methodology

Sample:

130 students from a Midwestern University, who signed up to participate during classroom recruitment sessions, assigned to 17 experimental and 17 control groups.

Experimental Design:

Participants were invited to partake in a study on "knowledge acquisition", in which they were asked to work through a task (a 15 question general knowledge test) in a small group setting.

Both experimental and control groups were told to use all resources available to them in order to complete the test (including fellow group members and anything they brought with them to the session). Control group members were asked not to use their cell phones during the test, while experimental group members were allowed to do so.

Data Collection:

Qualitative and quantitative data were collected during experimental sessions via observations by the researcher and participant observers inside the groups, a post-test survey instrument and focus group discussions.

Variables

The main variables utilized in the quantitative hypothesis tests, and elaborated upon with qualitative observations, include:

Cell Phone Use: How often individual group members used cell phones during the experimental session.

Aid Given and Received: The amount of interaction between group members, calling upon others for aid and aiding others during the experimental session. (1st dimension of social capital)

Reciprocity: The feeling of shared obligation which existed between group members. (2nd dimension of social capital)

Trust: The feeling of trust that Individual group members had of the entire group. (3rd dimension of social capital)

Interaction Quality: The perceived quality of interactions which took place between group members during the experimental session.

Information Sharing: The factors which affect information sharing in small groups: willingness to engage, accessibility of group members and feelings of togetherness.

For a summary of the univariate results for these variables see **Table 1** below.

Table 1

Summary of quantitative results, Mean and (Standard Deviation), for experimental and control group participants.

	Control	Experimental
Cell Phone Use	---	4.11, (1.80) "4 to 9 times"
Aid Given and Received*	14.02, (4.52)	9.08, (4.72)
Reciprocity	10.53, (2.54)	10.14, (3.06)
Trust*	8.89, (2.61)	10.00, (2.72)
Interaction Quality	28.51, (7.61)	27.82, (8.28)
Information Sharing	22.56, (7.22)	21.89, (7.75)

*Difference between experimental and control groups is significant, p<.05

Results

Hypotheses were analyzed quantitatively with a series of t-tests (comparing means for experimental and control groups) and regression analyses including a Path model illustrated in **Figure 1** below.

Hypothesis 1: When cell phones are used in a group, members will be less likely to call upon others for aid. **Supported.** $t=5.90$ ($df=121$), $p<.01$; $B=-.542$, $\beta=-.207$, $p<.05$.

Hypothesis 2: When cell phones are used in a group, members will report lower levels of perceived reciprocity. **Not Supported.** $t=.76$ ($df=121$), $p>.05$; $B=-.221$, $\beta=-.131$, $p>.05$.

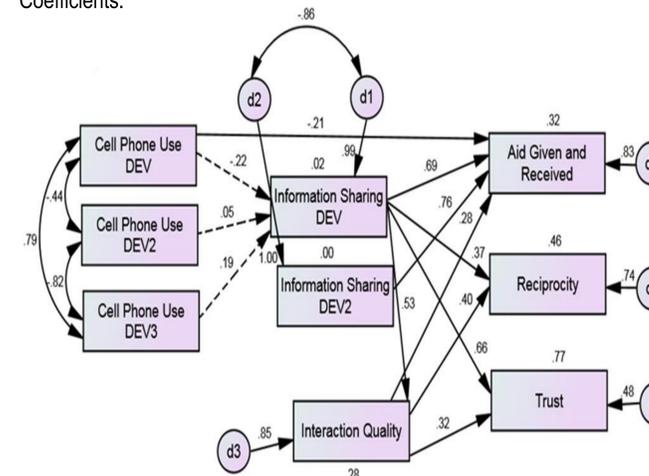
Hypothesis 3: When cell phones are used in a group, members will report lower levels of perceived trust in fellow group members. **Partially Supported.** See **Table 2** below for results.

Hypothesis 4: When cell phones are used in a group, members will report lower levels of the factors which contribute to information sharing. **Partially Supported.** $t=-.49$ ($df=121$), $p>.05$; See **Figure 2** for an illustration of the cubic relationship between these variables.

Hypothesis 5: When cell phones are used in a group, members will report lower quality interactions with other members. **Not Supported.** $t=.48$ ($df=121$), $p>.05$; $B=-.603$, $\beta=-.131$, $p>.05$.

Figure 1

Path Model of Cell Phone Use and Social Capital Formation: Standardized Coefficients.



Note: dashed lines indicate non-significant coefficients; model represents results for experimental group participants.

Table 2

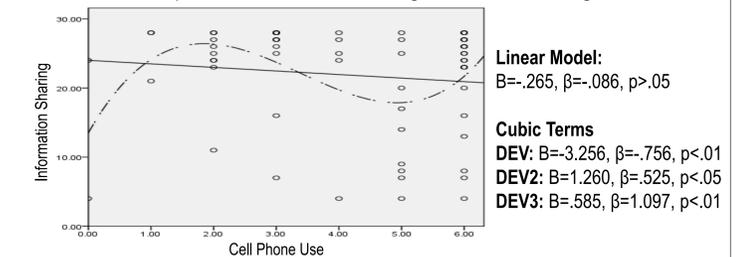
Results for Analysis of Cell Phone Use, Trust, and Individual Trust Indicators

	t-test Results	Regression Results
Overall Trust Variable	$t=-2.29^*$ ($df=121$)	$B=-.221$, $\beta=-.131$
"Members of this group can be trusted to provide useful information".	$t=-2.29^*$ ($df=121$)	$B=.024$, $\beta=.023$
"I could really trust those who I interacted with during the test".	$t=-1.51$ ($df=121$)	$B=-.200^*$, $\beta=-.251$

*Significant, p<.05

Figure 2

Cubic Relationship: Cell Phone Use Predicting Information Sharing.



Linear Model:
 $B=-.265$, $\beta=-.086$, $p>.05$

Cubic Terms
DEV: $B=-3.256$, $\beta=-.756$, $p<.01$
DEV2: $B=1.260$, $\beta=.525$, $p<.05$
DEV3: $B=.585$, $\beta=1.097$, $p<.01$

Qualitative Discussion

The strongest effect from cell phone use was found in regards to group members calling upon one another for aid. Observations during experimental sessions support this finding, with longer periods of silence and more individualism among group members when cell phones were used. There was also a difference in the interactions which took place between group members. Brevity and efficiency ("double-checking" answers and then back to Google) characterized interactions when cell phones were used, with more deliberation and discussion occurring in the absence of cell phone use. A higher level of confidence in the test answers derived via cell phone use also relates to less need for group interaction in the first place; as one experimental group member put it: "I forgot right away there was even a group."

As we can see in **Table 2**, there appear to be two different types of trust at play in experimental and control groups. When cell phones were used, there was more trust in the information provided by others, and with higher levels of cell phone use there was a decrease in the trust of fellow group members themselves. Along with an increased trust in information being provided by others, there was also less critical discussion (asking questions and discussing results) among those groups using cell phones.

There was no quantitative difference found in the feeling of mutual help between experimental and control group members. And yet, observations and focus group discussions suggest that a "quick and easy" sense of reciprocity existed in experimental groups, and one which required more effort from participants (and thus may have been rated lower) was at play in control groups.

Figure 1 and **Figure 2** demonstrate a negative trend in the non-linear relationship between cell phone use and the predictors of information sharing, especially in the moderate range of cell phone use. We also see that both Information sharing and interaction quality act as moderating variables, with higher levels of cell phone use being tempered in their effects on social capital formation when higher quality interactions, greater willingness to engage, feelings of togetherness and accessibility are present in groups.

Despite this mediating effect, the observed tendency towards individualism and less necessity of developing trust and reciprocity within groups appears to override engaging in high quality and mutually beneficial interaction to begin with.

Conclusions

Cell phones hold great potential as a tool for information resources and contacting existing network members. However, this study indicates that use of cell phones reduces the need for interacting with others in our daily lives, intensifying individualism, and limiting our potential for the formation of new and diverse "weak ties" which are vital to everything from finding a job to community building and social movements (Granovetter, 1983).

While those engaged in interactions alongside cell phone use may feel a sense of trust and reciprocity among group members, it appears that these feelings are due to a confidence in the technology rather than the conversational others themselves. As such, cell phone use appears to reduce the desire to take part in the formation of meaningful social relationships, and may substitute them with more superficial exchanges from which help "down the road" (i.e. social capital) may never be realized.