Can you help me now?: An experiment in the effects of cell phone use on social capital formation in group settings

Abstract

Trends in both social capital and the use of cell phones suggest that there may be both positive and negative effects when it comes to the formation of social capital (calling upon others for aid and developing a sense of trust and reciprocity). Utilizing an experimental design, and both qualitative and quantitative data collection and analysis, this study tests the effects of the presence and use of cell phones on social capital in a small group setting. Results indicate an overall negative impact of cell phone use on social capital formation, with differences in the types and degrees of interactions occurring in the presence and absence of cell phone use. The form of trust and reciprocity among group members is also different, with less trust in individuals (though greater trust in the technology), and a greater hesitance to seek out or give assistance when cell phones are used in groups.

Keywords

Cell phone use, social capital formation, small group interaction, experimentation, trust, reciprocity

Cell phones are the most widely spread communication technology in the modern day, having spread further and more rapidly around the world than any other related technology in history, including landline telephones and the Internet (Rainie and Wellman, 2012; Rainie, 2013; Degusta, 2012). Despite their omnipresence in our daily lives, there is relatively little research into the effects of cell phones on our social world. Popular conceptions, such as those portrayed in commercials and other media sources, suggest that cell phones have a positive impact on our ability to communicate to a greater degree with a wider swath of the population. Previous empirical 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). Social capital, which plays an important role in the formation of community and support systems, is formed in the interactions we have with one another on a daily basis, especially when calling upon others for aid (Coleman, 1990; de Tocqueville, 1966; Bellah, et al., 1996).

Along with the rise of cell phones over the past several decades, there has been a general decrease in social capital in the United States with increased potentials for individualism (Putnam, 2000). 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 and Kwak, 2011; Julsrud and Bakke, 2009; Miyata, Boase and Wellman, 2008; Wei and Lo, 2006; Chan, 2013), which would may indicate a positive effect on social capital and its formation. However, when it comes to the formation of new network connections, cell phones may play a more limiting role via a reduction of interaction quantity and quality in daily life (Ling, 2008;

Turkle, 201l, Geser, 2005; Przybylski and Weinstein, 2013; Misra, Cheng, Genevie and Yuan, 2014; Cross and Borgatti, 2004; Van den Hooff, De Ridder and Aukema, 2004). This study intends to shed new light on the relationship between cell phone use and the formation of social capital, utilizing an experimental design in order to examine the effects of this technology on an important social process.

Social Capital

Social capital is generally defined as the "connections among individuals-social networks, and the norms of reciprocity and trustworthiness that arise from them" (Putnam, 2000: 19). In other words, social capital is the "stuff" which helps to facilitate collective action between members of a society, neighborhood, work group, or any other conglomeration that must work together for purposes of mutual benefit (Uphoff, 2000). These networks and norms have both an individual and structural basis. Networks are built by individuals making connections with others (Putnam, 2000), but the conditions under which the networks form, and in which one might feel comfortable reaching out to call upon their network (i.e., reciprocity and trust), are more structural in that they are built into the society or group in their influence on members (Lochner, Kawachi, and Kennedy, 1999; Putnam, 2000; Dekker, 2004). As a structural and individual concept, social capital has many benefits to offer individuals, beyond the collective benefits felt by groups as a whole, such as gaining needed knowledge, information or economic advancement (Coleman, 2000; Putnam, 2000). In this study, social capital is conceptualized in three main dimensions: networks, the set of relationships from which support is drawn when needed (Coleman, 2000; Halpern, 2005; Putnam, 2000); trust, the trusting feelings that individuals have of their group or community, which help to build and strengthen network connections (Halpern, 2005); and reciprocity, the expectation of fulfilling obligations

which exist between members of a network (Putnam, 2000; Coleman, 2000). The utilization of social capital as a multidimensional concept allows for its measurement and examination as it manifests among individuals (Lochner, Kawachi and Kennedy, 1999; Putnam, 2000; Coleman, 1990).

While narrowing our definition of social capital, it is also important to differentiate between existing social capital, and social capital formation. Many studies involving social capital are geared towards an account of what social capital looks like, or how different levels of social capital affect various social phenomena. For instance, Helliwell and Putnam (2000) examine social capital levels in Italy, suggesting that it helps to explain differences in economic status between geographic regions. This approach to social capital is more descriptive, and focused on those things which social capital effects on a larger scale. On the other hand, we have those studies which are more interested in the formation of social capital, and the factors which play a role in its utilization. Cross and Borgatti (2004), and Van den Hooff, De Ridder and Aukema (2004) look at the factors which affect those seeking information, such as access to network members, perceived engagement of others and a sense of collectivism. They find that the sharing of information creates reciprocity and that using social capital effectively has more to it (i.e. relational factors) than simply the size of one's existing network. As it is formed at the individual level, social capital takes place in the interactions among network members. As James Coleman (1990: 321) states, "the more extensively persons call on one another for aid, the greater will be the quantity of social capital generated". For our purposes in this study, investigating a factor which might affect social capital, it seems that a focus on the formation of social capital (utilizing on all three of its dimensions), isolated from other factors of influence,

will be most rewarding. The formation of social capital is, after all, the gateway to the establishment of social networks and a precursor to the use of social capital in existing networks.

Regardless of how it is approached, social capital has received much attention over the years, both in academic and public spheres, as a factor of great importance to human society. While the term "social capital" is a relatively recent phenomenon, coined by several academics in the twentieth century (most notably James Coleman and Robert Putnam), the theoretical underpinnings of the concept have been around for much longer (Coleman, 1990; Putnam, 2000; Halpern, 2005). For instance, Alexis de Tocqueville (1966), in his observations of the US. in the mid-nineteenth century, made note of the importance of organizational memberships and voluntary associations (i.e. network connections) in the operation of a democratic society.

As it is a theoretically important concept, there have been many attempts to understand how social capital has changed historically. Putnam (2000), whose definition we began with, suggests that social capital has been declining in the US over the last half century. He notes changing levels of membership and participation in civic engagement activities and social organizations/groups, such as fraternal organizations and even bowling leagues (Putnam, 2000). This decline in social capital may be attributable to factors of modernization, such as busy schedules, tight budgets and suburban living to name a few (Putnam, 2000). These factors contribute to a sense of individualism, and have the potential to cut into the collective basis upon which social capital is built (Van den Hooff, De Ridder and Aukema, 2004). One of the most interesting factors that may be contributing to a rise in individualism is modern technology, especially television and mass media. Shah (1998) finds that television use relates negatively with trust, and that this negative contribution to engagement with others could also affect trust and thus the potential for social capital formation. Part of this may be due to the television being

a private form of entertainment, which draws individuals into their own private lives whereas they might be drawn out into public with other forms of entertainment like theatres or social clubs in years past (Putnam, 2000).

Along these same lines, research has also suggested an influence of the Internet on social capital in modern times. Some of this past research seems to suggest that there is a positive relationship between Internet use and social capital. For instance, whereas television tends to draw people away from interaction in its very one-sided use, the Internet has the potential to be used to make connections with others, engage in the civic and social world, and even serve as the platform on which networks and relationships reside (Kwak, Poor and Skoric, 2006; Shah, et al., 2002; Turkle, 2011; Castells, 2000). Others suggest that use of the Internet may relate negatively with social capital, in terms of displacing time which might otherwise be spent engaging civically or interacting with others, and decreases in a sense of offline community (Nie, Hillygus and Erbring, 2002; Katz and Rice, 2002). Even in virtual communities, in which individuals form networks that can offer support online and offline (Rheingold, 1993), the self-selecting nature of these connections may actually lead to a reduced, and perhaps even superficial, likelihood of social support (Turkle, 2011; Castells, 2000). But what about a technology that is more personal in its use and purpose, which connects network members to known others via direct communication, like the cellular phone? How might use of this technology affect the formation of social capital?

Cell Phones and Social Effects

Teenagers die after texting while driving, our children are changing the way in which they speak and write, work life is coming ever closer to the home; these topics would seem right at home in the news headlines to those who lived through the years in which cell phones had

their meteoric rise to the most widespread communication technology in history. As of 2013, the Pew Research Center estimates that some 91% of US adults own a cell phone, up nearly 30% since 2004 (Rainie, 2013). The cell phone has also had a remarkable spread globally, with "2G" (second generation transmission technologies) coverage available to around 90% of the world's population as of 2012 (Degusta, 2012).

Much of the empirical work which has been done in regards to the effects of this omnipresent technology use have focused on distractions which affect individuals, such as texting while driving (which has generated laws in 46 US States), parenting with electronic devices, or multitasking and task effectiveness (Radesky, et al., 2014; Ophir, Nass and Wagner, 2009; GHSA, 2015; Atchey, Atwood and Boulton, 2011). Despite the interesting and even lifesaving findings of this more popular public and empirical focus, what is missing is a discussion of how these effects, and others, play out on a larger scale, beyond just the lives of individuals in society. In other words, how do cell phones affect us socially, and what role do they play in our social relations with one another?

As a technology which deals with communication, the main issue when it comes to the influence of cell phones on larger social phenomena, is whether or not cell phones add to, or detract from, our engagement and interaction with other individuals. The advent of cell phones has greatly increased our abilities to communicate, breaking us free from a set location and allowing us to reach nearly anyone at any time. In this way, the cell phone offers us a "perpetual contact" with those we know (Katz, 2008; Katz and Aakhus, 2002), which, when coupled with the mobility offered by this technology, appears to allow for the possibility of making lasting connections with a wider variety of people (Urry, 2007). It has also been shown that cell phones allow for control of social support, such as a member of an addiction support group adding more

and newer "supportive" contacts to their phone to call upon, instead of those connections which may have had a more negative influence in the past (Campbell and Kelley, 2008).

It would seem to follow that this increase in the possibility of useful interactions has translated into more engagement with others, and it is to this end that cell phones may relate positively with the formation of social capital. In an ethnography of cell phone use in Jamaica, Horst and Miller (2006) find that cell phones allow users to maintain large networks which they utilize for a variety of benefits, from maintaining existing networks to asking others for help with college money and even "hooking up" with sexual partners. This example seems to show that cell help to support networks and give access to a diversity of networks which we may need to call upon for help and support (Hampton, Lee and Her, 2011). Similarly, Putnam (2000:169) suggests that telecommunication technologies (including the cell phone) help to "offset some of the disconnection" with networks, characteristic of individualism, that can lead to decreases in social capital. Cell phones have also been shown to play a major role in the mobilization of resources (human and otherwise) in political movements in recent years, from Central America to the Middle East, allowing users to transmit information and video otherwise censored in the mainstream media, and even offer new forms of collective action such as "flash mobs" (Rheingold, 2008; Morozov, 2011; Castells, 2012).

There is another side to this relationship however, with research pointing to the possibility that as our cell phone use has increased, our levels and quality of interpersonal engagements have been negatively affected. Previous research suggests that while the amount of communication has increased overall, the presence of cell phones has led to a lower quality of engagement, especially in those interactions which do not take place over the phone (Misra, et al., 2014; Przybylski and Weinstein, 2013; Hampton, Goulet and Albanesius, 2014; Humphreys,

2005). This includes experimental research, examining the interactions between dyadic groups, which suggests that although engagement can, and does, take place face-to-face when a cell phone is present, the presence of a cell phone significantly decreases the quality of conversations, and those individuals engaged in this situation tend to have less empathy towards their conversational partners (Misra, et al., 2014; Przybylski and Weinstein, 2013). As such, when it comes to building networks and making new connections, cell phones may actually hinder this process by diminishing the "...'here and now' interactions with co-present others" (Misra, et al., 2014: 17).

Although cell phones allow for multiple lines of communication, and thus would seem to increase the possibility of interactions with others, research has also suggested that when a call is received on a cell phone, it has the tendency to alienate the cell phone user from others who are present (Humphreys, 2005). Previous studies also indicate that the use of cell phones in public places can limit the likelihood of reaching out to make connections with those around us, and thus we are very much alone in the presence of others while using our phones (Ling, 2008; Turkle, 2011), shutting off possibilities for social engagement in general (Groening, 2010).

Given these findings, it appears that cell phones may limit our ability to make new connections, thus decreasing the possibility of forming new connections in our networks. This may be due to the cell phone acting as a sort of "digital umbilical cord," keeping us tied to our preexisting networks wherever we go (Ling, 2004; Paragas, 2009; Geser, 2005). As such, it is possible that cell phones contribute to the "nucleation," or contracting, of our social networks around a smaller group of strong ties, such as those with close friends and family members (McPherson, Smith-Lovin and Brashears, 2006). Use of cell phones to contact and maintain existing relationships also offers a sense of security and trust (Kobayashi and Boase, 2014),

replacing the necessity of reaching out beyond existing relationships for assistance (Katz, 2005). There may also be a kind of "hyper-individualism" at play with cell phones, as they allow users to actively select the networks and information (especially when considering smart phones and Internet capabilities) which they feel are most comforting to them (Groening, 2010).

This line of research would seem to indicate that cell phones may have a negative impact on the formation of social capital via a reduction in new network connections and even the necessity of calling upon others for aid in the first place. When it comes to making new connections, or solving problems/sharing information within networks of weaker ties, it also appears that cell phones relate to greater feelings of loneliness and distrust (Hampton, Goulet and Albanesius, 2014; Jin and Park, 2012; Kobayashi and Boase, 2014), and thus may alienate group/network members from one another when an existing network connection is not present (Humphreys, 2005). Therefore, despite the findings that social capital is supported by cell phone usage in existing networks (with family and friends), it may not be formed as readily in new networks when cell phones are present or in use. Furthermore, research which suggests that cell phones affect the quality of face-to-face conversations, and feelings of empathy among conversational partners in a negative manner (Misra, et al., 2014; Przybylski and Weinstein, 2013), would seem to suggest that in those situations where cell phones are present or in use, there is a lower likelihood of developing a sense of togetherness and reciprocity among network/group members.

Method

The experimental method utilized in this study was designed to put research subjects into a situation in which engaging in interactions, sharing information, and working together towards some end, in other words social capital via calling upon others for aid (Coleman, 1990), would

be beneficial to them. This allowed for the testing of whether cell phones to add to or detract from the formation of social capital. An experiment allowed for isolation of the effects of cell phone use by removing other variables from the picture (Cook and Campbell, 1979; Babbie, 2005), including pre-existing social capital and relational factors such as friends/relationships which might be present during observations or surveying in a field setting. This isolation of effects was especially important for the subject matter under study, given that past research on the influence of technology has been criticized for a divergence between how people view the effects, and what the actual effects may be, including the effects of cell phone use on driving performance and multitasking (Lessch and Hancock, 2004; Ophir, Nass and Wagner, 2009). As such, using a method that allows for the testing of cell phone effects as they exist, rather than how they are perceived by users (i.e. in a self-report survey of daily use), is a major benefit to furthering our understanding of this technology.

Building on the work of previous research, which found impacts from the presence of a cell phone on the quantity and quality of interactions in dyadic communications, (Misra, et al., 2014; Przybylski and Weinstein, 2013), this experimental design is unique to the current study, in its focus on larger social processes and utilization of multiple data sources, which may help to pave the way for future research into the effects of cell phones and other technologies on our social world.

During the experiment, both qualitative and quantitative data were collected in a mixed methods approach. Qualitative observations were made by both the primary researcher and participant observers who sat in on the sessions. Quantitative data was collected via a survey of participants regarding their experiences during the experimental sessions (quantity of interactions, trust, etc.), and focus groups at the end of each session collected qualitative data

regarding individual and group experiences during the experimental sessions. This use of multiple methods served to triangulate the data and provide a more robust picture of the relationships under study. A sample of 235 undergraduate college students was recruited through in-person announcements in classrooms on the campus of a large-sized Midwestern public university. Participants were randomly assigned to one of 17 experimental groups, in which subjects were able to use cell phones, and 17 control groups in which cell phone use was not allowed. At the end of the data collection period, a total of 123 participants (13 control groups, N=57, and 16 experimental, N=66), a 55% participation rate, supplied data which could be utilized in the analysis.

When research subjects arrived at the experimental sessions, they were asked to work through a "general knowledge" test using all resources available to them, including other members of the group and anything that they may have brought with them. For the experimental groups, this included the use of cell phones, and for control groups subjects were asked not to use their phones due to sensitive equipment being used nearby. This basic announcement set up the difference between experimental and control groups, using or not using cell phones in a group setting. The test which participants worked through was designed such that no one individual would be likely to know all of the answers, and thus turning to fellow group members or to outside sources via cell phones (such as the Internet or "phone a friend") would be beneficial to its completion.

Variables and Analysis

The variables operationalized in this study draw from the discussion of social capital and cell phone use above. The main dependent variable, *Cell Phone Use* was dealt with in two main ways. First, it was coded for presence and absence (values of zero or one) of cell phone use

during experimental sessions, allowing for a series of t-tests between groups in order to determine effects of the presence of cell phones. Second, the amount of cell phone use which took place those in experimental groups was assessed using a count variable in the survey instrument (a seven point scale from "zero" to "ten or more times"), which was utilized in regression analyses. The three dimensions of social capital formation constituted the main independent variables in this study. The amount of group interaction, or *Aid Given and Received* (the formation of network connections) was assessed using a series of questions[1] on the post survey instrument, summed into a single compound variable, with values ranging from one to twenty-two, regarding how many times participants had asked for or received help from others during the testing period. The feelings of *Trust* and *Reciprocity* among and between group members were also measured via questions on the post survey[2], and were computed into compound variables, with values ranging from two to fourteen, for both t-tests and regression analyses. Along with these quantitative measures, the qualitative observations of participants and groups was utilized in order to contextualize the analysis and interpretation of these variables.

Results

The mean value for the amount of cell phone use was 4.11 (on the seven-point scale), with a median of 4.50 and a standard deviation of 1.80, which suggests that the typical experimental group participant used their cell phone during the test approximately four to nine times during the testing period. Overall, these findings suggest a moderate to high degree of cell phone use among experimental group members. As we can see in the comparison of means in Table 1 below, the compound variable *Aid Given and Received* had a mean value of 14.02 among control group members, and 9.08 among those in experimental groups, suggesting that a higher level of

interaction (and thus potential for creating social capital) was had by those who were unable to use cell phones during the group task. This difference in means was found to be significant ($t=5.90$, $df=121$, $p<.01$) when examined with a t-test, which indicates that the presence of cell phones has the potential to negatively affect the quantity of interactions and aid giving/receiving among group members. For *Trust*, control group participants had a mean value of 8.89, and among experimental group members the mean was 10.00. With a significant t-test ($t=-2.29$, $df=121$, $p<.05$), there appears to be a greater tendency towards trusting feelings when cell phones are present in a group setting. With a *Reciprocity* mean value of 10.53 among those in control groups, and 10.14 among those in experimental groups, there does not appear to be a major difference in feelings of reciprocity in the presence and absence of cell phones in groups. This lack of difference is corroborated by a non-significant t-test as well ($t=.76$, $df=121$, $p>.05$).

The next stage of the analysis involved carrying out a series of regression analyses, in order to test whether higher levels of cell phone use had an effect on the social capital formation variables. The summary of these regressions can be found in Table 2 below. When *Aid Given and Received* was regressed on *Cell Phone Use* among experimental group members, a significant unstandardized coefficient of -.797 ($p<.05$) was found. This negative relationship indicates that for every one-unit increase in *Cell Phone Use* among experimental group members, we can expect to find a .797-unit decrease in *Aid Given and Received*. A standardized coefficient (beta value) of -.303 indicates that this relationship is moderate in its effect size on *Aid Given and Received*. These results appear to indicate that the degree of cell phone use also has an impact on interactions among group members. This regression also finds that *Cell Phone Use* accounts for 9.2% of the variance in *Aid Given and Received*, ($R^2=.092$), which indicates

that there is much more at play in the influence of giving and receiving aid, beyond just the amount of cell phone use among group members.

The regression of Reciprocity on Cell Phone Use did not find a significant relationship between these variables. As noted in Table 2, the trend between *Cell Phone Use* and *Reciprocity* appears to be negative and weak (B=-.176, β=-.103), but with a non-significant model explaining only 1.0% of the variance in *Reciprocity*, it does not seem that experimental groups had significantly lower levels of perceived reciprocity when cell phones were used to a greater extent. Coupled with the non-significant t-test between experimental and control groups, it appears that feelings of reciprocity are not significantly impacted by the use or presence of cell phones in a group setting. As for *Trust*, the regression model predicting this variable based on *Cell Phone Use* in experimental groups was found to be non-significant, only accounting for 1.4% of the variance in the dependent variable. A weak negative trend does appear however (B=-.176, β=-.116, p>.05), which seems to hint at the possibility of a negative impact of higher levels of cell phone use on perceived trust among group members. As the initial t-test indicated higher levels of trust when cell phones were present in groups, a further discussion and examination of this relationship, and those with the other variables, is necessary in order to grasp the directionality of the relationship between cell phone use and social capital formation.

Discussion

In most groups, both experimental and control, there was an initial period of silence as group members worked through and looked at the tests which were distributed. As described by respondents in the focus group sessions, this was a period of "awkward silence," when group members were unsure as to whether or not they should interact with one another. In both group types, participants expressed a sense of relief when the "ice" was finally broken and

conversations/interactions began within the group. While both experimental and control groups appeared to go through a similar pattern in terms of the awkward silence and breaking the ice, the length of this period of silence differed between the group types. For control groups for, the average time to the ice-breaker was 1.75 minutes, with the longest period being six minutes, and many of the groups initiating interaction right away (at time zero). As for the experimental groups, the average time to the ice-breaker was 5.47 minutes, with times ranging from a low of zero to a high of 20 minutes (no interaction between group members for the entire testing period). These observations help to offer some explanation for why control group members reported more giving and receiving of aid than experimental groups, with interactions simply taking place for more of the testing period when cell phones were not used. That there was trepidation among participants when it came to breaking the ice is not surprising, as stepping out to make new connections, in other words sticking your neck out to ask for help, is often felt to be a "dangerous activity" (Cross and Borgatti, 2004). It is possible, then, that turning to cell phones instead of other group members served as a "safety" device in experimental groups, offering participants a sense of comfort in an otherwise "new" situation. This possibility was suggested, with the "digital umbilical cord," which keeps cell phone users connected to their existing networks wherever they go, thus limiting the necessity of making new connections in the first place (Ling, 2004; Paragas, 2009; Geser, 2005). The digital umbilical cord argument suggests that cell phones are used to connect with existing social networks. However, given that not one instance of reaching out to existing networks was observed, such as calling a friend or texting a family member who might know the information on the test. Instead of using phones to connect to other network members, they were used as conduits for information from the Internet (all of the observed phones were smart phones, and most of the observed use involved looking up

answers on search engines). This may suggest that as a part of networks and social capital, the cell phone itself may be an important member, allowing users to connect with "known" sources of information when in need. As such, instead of being an umbilical cord, cell phones appear to be more of a "security blanket", which helps to quell the uncertainty which exists in new situations and gives users access to various resources outside of their physical location. The time spent in silence also suggests a greater tendency towards individualism in experimental groups. As one participant stated, "I initially thought of it as an individual but once someone started talking, then a group." As we have seen in previous theory and research, individualism has a negative impact on social capital. That cell phones may play the role of a security blanket, removing the necessity of interacting with others, suggests that the presence of cell phones in a group setting has a negative impact on social capital and its formation.

Beyond the amount of interaction which took place in experimental and control groups, there were also marked differences in the types of interactions between group members. In some experimental groups, there was delegation of the task, with groups members taking several questions to look up and then sharing the answers with the rest of the group, though the majority of interaction in these groups involved double checking answers which were already ascertained using cell phones, or simply calling out answers when asked. With control groups, there was more discussion and consideration, even questioning and challenging answers that were offered to the group; in other words, control group members tended to act more like group members. The efficiency and brevity of the interactions surrounding help in experimental groups suggests that when cell phones were used there was less importance attached to the act of helping others out. In other words, if everyone in the group has a cell phone, they should all be able to look up their own answers, so why help out? According to one experimental group member, "once the

cell phones were out it was like 'oh I can just do it on my own,'" and another went even further stating that: "I forgot right away there was even a group."

The quantitative analysis found that for overall trust there were significantly higher levels when cell phones were used in experimental groups. However, further breakdown of the trust indicators reveals a difference in the types of trust at play in the presence and absence of cell phone use. The indicator question which focused more on trust in others to provide accurate information was found to be significantly higher among those who could use cell phones ($t=-2.29$, $df=121$, $p<.05$). Furthermore, a regression analysis reveals that for higher levels of cell phone use among experimental group members, there was a negative relationship with the trust indicator dealing with trust in the other group members themselves ($B=-.200$, $\beta=-.251$, $p<.05$). These findings suggest that when cell phones were used, there was more trust in the phones being able to provide correct information, and slightly less trust in the actual people who were being interacted with. This trust in information is interesting, especially when coupled with the observation of less discussion among those using cell phones (taking answers as given with no questioning of accuracy). While in most cases the trust was well placed, there were several instances in which experimental groups arrived at the wrong answers due to this lack of critical back and forth. And while less disagreement in groups may be seen as a benefit, it has been suggested that such deliberation and even argumentation among individuals is necessary in order to advance and develop community structures and social capital (Habermas, 1987; 1984).

While there appears to be a more complex effect of cell phone use on trust among group members, the quantitative results suggest that there is no significant impact from cell phones on perceived reciprocity. While there may have been no effect, it could also be that the effect was not picked up by the indicators used in the survey instrument. Indeed, with a limited number of

short and efficient interactions not involving a high degree of discussion, it seems that there would also be limited amounts of reciprocity (feelings of being helped down the line when help is given) which were experienced among those in experimental groups. In other words, how likely is it that there would be a feeling of mutual help in a setting in which help was not given or received at a very high level, and what help did exist was more superficial in its application? In one experimental group for instance, a participant started out the test session by asking a question aloud, only to be met by complete silence from the rest of the group (who were all using their cell phones). After this interaction, or lack-thereof, the participant went back to working on her own test and didn't interact with the rest of the group as much when the initial period of silence was finally over. In this example, there appears to be a lack of reciprocity at play, in that without receiving help when requested initially, the individual and the rest of the group may have been less likely to feel that their assistance would be reciprocated down the line. The reason that experimental group members answered the survey questions related to reciprocity at a level similar to those in control groups, may be due to the interactions they had towards the end of the testing period (after the "ice" was broken). It may be that the help which was received from other group members, and the ease and brevity by which it occurred, made experimental group members feel that helping out others in the group would not require as much effort, thus inflating aspects of reciprocity. These feelings of reciprocity may be somewhat superficial (not much beyond the surface interaction of sharing an answer), and thus experimental groups could have lower levels of reciprocity than those reported. The results from such a possibility on social capital formation could be rather interesting. If one feels a sense of reciprocity within a group or community based on help which was quickly and efficiently given and received, they may

overestimate the actual ability or even willingness of other group members to help them out in more serious situations (such as having a car break down or repairing a roof).

Limitations

There are several limitations to this study, affecting both its scope and the measurement of concepts, which temper our interpretation of the findings. As we discussed above, the sample was drawn from the undergraduate population of a Midwestern university. As such, there are limits to how much we are able to generalize the findings of the experimental method, especially when it comes to age and generational differences with the larger population. Another limitation of this study comes down to the operationalization of variables in the survey instrument. As we have seen throughout the analysis and discussion, there appear to be differences in the types of trust, reciprocity, and interactions which existed in experimental and control groups. However, the indicators of these variables on the survey instrument did not seem to fully capture these differences. While it was beneficial in this regard to utilize a mixed methods approach, with qualitative observations illuminating the differences, future research of this relationship should consider the use of more fully developed scales of trust, reciprocity and group interactions.

Conclusion

When cell phones are being used, engaging in discussions to arrive at the answers on a test (or some other task) may no longer be necessary, as information can be looked up quickly and easily by an individual. Without interacting with others and calling upon them for aid, social capital cannot be realized (Coleman, 1990). And without these interactions, the relationships that compose networks in which social capital exists cannot be fully formed. When interactions do occur, we have found they are more likely to be quick and efficient, and to generate less trust

among those who are interacting. In such a setting, it is difficult to imagine meaningful levels of trust, reciprocity and network connections being formed or sustained. And so, the presence and use of cell phones in groups appears to have an overall negative effect on the three dimensions of social capital formation. What we have found in this study seems to suggest that, while cell phones are a tool which can positively affect social capital and its formation, this same tool tends to make us less likely to put in the work (interaction, discussion, and the development of reciprocity and trust) which is necessary to form meaningful social capital via a diversity of network connections in the first place. This study also suggests that as we move into the future, in which cell phones (and whatever replaces them down the line) will no doubt continue to play a major role in our daily lives, we must be willing critically examine and test these technologies as they impact our social lives.

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Notes

1. The questions used to compute this variable asked about the number of times participants asked for help/assistance in interactions with other group members, how many times help was given to them, as well as the number of people with whom the participant had interactions during the testing period.
2. Trust was assessed using the following indicator statements on a five-point Likert-type scale (strongly agree to strongly disagree): “I felt that I could really trust those who I

interacted with during the test;" and "In general, the members of this group can be trusted to provide useful information." On the same five-point scale, the reciprocity indicator statements were: "helping others during the test made me feel that I would be helped if I needed it;" and "I felt an obligation to help other group members during the test."

References

Atchey P, Atwood S and Boulton A (2011). The choice to text in younger drivers: Behavior may shape attitude. *Accident Analysis and Prevention* 43(1): 134-142.

Babbie E (2005) *The Basics of Social Research.* Belmont, CA: Thompson Wadsworth.

Bellah RN, Madsen R, Sullivan WM, Swidler A and Tipton SM (1996) *Habits of the Heart, Individualism and Commitment in American Life.* Los Angeles, CA: University of California Press.

Campbell SW and Kelley MJ (2008) Mobile phone use among Alcoholics Anonymous members: new sites for recovery. *New Media & Society* 10(6): 915-933.

Campbell SW and Kwak N (2011) Mobile communication and strong network ties: Shrinking or expanding spheres of public discourse? *New Media & Society* 14(2): 262-280.

Castells M (2000) *The Rise of the Network Society. The Information Age: Economy Society and Culture, Volume 1*. Malden, MA: Blackwell Publishing, Ltd.

Castells M (2012) *Networks of Outrage and Hope, Social Movements In the Internet Age.* Malden, MA: Polity Press.

Coleman J (1990) *Foundations of Social Theory.* Cambridge: Belknap Press.

Coleman J (2000) Social capital and the creation of human capital. In Dasgupta, P. & Serageldin, I. (Eds) *Social Capital, A Multifaceted Perspective.* Washington, D.C.: The World Bank.

Cook TD and Campbell DT (1979) *Quasi-Experimentation, Design & Analysis Issues for Field Settings.* Boston, MA: Houghton Mifflin Company.

Cross R and Borgatti SP (2004) The Tires That Share: Relational Characteristics That Facilitate Information Seeking. In Huysman M and Wulf V (Eds) *Social Capital and Information Technology*. Cambrdige, MA: The MIT Press.

de Tocqueville A (1966) *Democracy in America.* Mayer JP (Ed) Garden City, NY: Doubleday & Company, Inc.

Degusta M (2012) Are Smart Phones Spreading Faster Than Any Technology in Human History? *MIT Technology Review*. Available at: http://www.technologyreview.com/news/427787/are-smart-phones-spreading-faster-than-any-technology-in-human-history/

Dekker P (2004) Social Capital of Individuals: Relational Asset or Personal Quality? In Prakash S and Selle P (Eds) *Investigating Social Capital, Comparative Persepctives on Civil Society, Participation and Governance.* Thousand Oaks, CA: Sage Publications Inc.

Geser H (2005) Is the cell phone undermining the social order? Understanding mobile technology from a sociological perspective. In Glotz P, Bertschi S and Locke C (Eds)

Thumb Culture, The Meaning of Mobile Phones for Society. New Brunswick, NJ: Transaction Publishers.
GHSA (2015) Distracted driving laws. *Governors Highway Safety Association*. Available at: http://www.ghsa.org/html/stateinfo/laws/cellphone_laws.html
Groening S (2010) From 'a box in the theater of the world' to 'the world as your living room': cellular phones, television and mobile privatization. *New Media & Society* 12(8): 1131-1347.
Habermas J (1984) *The Theory of Communicative Action Vol. 1, Reason and the Rationalization of Society*. Boston, MA: Beacon Press.
Habermas J (1987) *The Theory of Communicative Action Vol. 2, Lifeworld and System: A Critique of Functionalist Reason.* Boston, MA: Beacon Press.
Halpern D (2005) *Social Capital.* Malden, MA: Polity Press.
Hampton KN, Goulet SL and Albanesius G (2014) Change in the social life of urban public spaces: The rise of mobile phones and women, and the decline of aloneness over 30 years. *Urban Studies*: 1-16.
Hampton KN, Lee C and Her EJ (2011) How new media affords network diversity: Direct and mediated access to social capital through participation in local social settings. *New Media & Society* 13: 1031-1049.
Helliwell JF and Putnam RD (2000) Economic growth and social capital in Italy. In Dasgupta P and Serageldin I (Eds) *Social Capital, A Multifaceted Perspective.* Washington, D.C.: The World Bank.
Horst HA and Miller D (2006) *The Cell Phone, An Anthropology of Communication.* New York, NY: Berg.
Humphreys L (2005) Cellphones in public: social interactions in a wireless era. *New Media & Society* 7(6): 810-833.
Jin B and Park N (2012) Mobile voice communication and loneliness: Cell phone use and the social skills deficit hypothesis. *New Media & Society* 15(7): 1094-1111.
Julsrud TE and Bakke JW (2009) Trust, Friendship, and Expertise: The Use of Email, Mobile Dialogues, and SMS to Develop and Sustain Social Relations in a Distributed Work Group. In Ling R and Campbell S (Eds) *The Reconstruction of Space and Time, Mobile Communication Practices.* New Brunswick, NJ: Transaction Publishers.
Katz JE (2005) Mobile Communication and the Transformation of Daily Life. In Glotz P, Bertschi S and Locke C (Eds) *Thumb Culture, The Meaning of Mobile Phones for Society*. New Brunswick, NJ: Transaction Publishers.
Katz JE (2008) Mainstreamed Mobiles in Daily Life: Perspectives and Prospects. In Katz JE (Ed) *Handbook of Mobile Communication Studies*. Cambridge, MA: The MIT Press.
Katz JE and Aakhus M (2002) Conclusion: making meaning of mobile – a theory of Apparatgeist. In Katz JE and Aakhus M (Eds) *Perpetual Contact.* New York, NY: Cambridge University Press.
Katz JE and Rice RE (2002) Syntopia: Access, Civic Involvement, and Social Interaction on the Net. In Wellman B and Hythornthwaite (Eds) *The Internet in Everyday Life.* Malden, MA: Blackwell Publishers Ltd.
Kobayashi T and Boase J (2014) Tele-Cocooning: Mobile Texting and Social Scope. *Journal of Computer-Mediated Communication* 19: 681-694.

Kwak N, Poor N and Skoric MM (2006) Honey I Shrunk the World! The Relation Between Internet Use and International Engagement. *Mass Communication & Society* 9(2): 189-213.
Lesch MF and Hancock PA (2004) Driving performance during concurrent cell-phone use: are drivers aware of their performance decrements? *Accident Analysis & Prevention* 36(3): 471-480.
Ling R (2004) *The mobile connection, the cell phone's impact on society*. San Francisco, CA: Elsevier.
Ling R (2008) The Mediation of Ritual Interaction via the Mobile Telephone. In Katz, J.E. (Ed), *Handbook of Mobile Communication Studies*. Cambridge, MA: The MIT Press.
Lochner K, Kawachi I and Kennedy BP (1999) Social capital: a guide to its measurement. *Health & Place* 5: 259-270.
McPherson M, Smith-Lovin L and Brashears ME (2006) Social isolation in America: changes in core discussion networks over two decades. *American Sociological Review* 71: 353-375.
Misra S, Cheng L, Genevie J and Yuan M (2014) The iPhone Effect: The Quality of In-Person Social Interactions in the Presence of Mobile Devices. *Environment and Behavior*: 1-24.
Miyata K, Boase J and Wellman B (2008) The Social Effects of Keitai and Personal Computer E-mail in Japan. In Katz JE (Ed) *Handbook of Mobile Communication Studies*. Cambridge, MA: The MIT Press.
Morozov E (2011) *The Net Delusion: The Dark Side of Internet Freedom.* Philadelphia: Public Affairs.
Nie NH, Hillygus S and Erbring L (2002) Internet Use, Interpersonal Relations, and Sociability: A Time Diary Study. In Wellman B. and Hythornthwaite (Eds) *The Internet in Everyday Life* (215-243). Malden, MA: Blackwell Publishers Ltd.
Ophir E, Nass C and Wagner AD (2009) Cognitive control in media multitaskers. *Psychology and Cognitive Sciences* 106(37): 15583-15587.
Paragas F (2009) Migrant Workers and Mobile Phones: Technological, Temporal, and Spatial Simutaneity. In Ling R and Campbell SW (Eds.) *The Reconstruction of Space and Time, Mobile Communication Practices.* New Brunswick, NJ: Transaction Publishers.
Przybylski AK and Weinstein N (2012) Can you connect with me now? How the presence of mobile communication technology influences face-to-face conversation quality. *Journal of Social and Personal Relationships* 30(3): 237-246.
Putnam RD (2000) *Bowling Alone, The Collapse and Revival of American Community.* New York: Simon & Schuster.
Radesky JS, Kistin CJ, Zuckerman B, Nitzberg K, Gross J, Kapplan-Sanoff M, Augustyn M and Silverstein M (2014) Patterns of Mobile Device Use by Caregivers and Children During Meals in Fast Food Restaurants. *Pediatrics* 133(4): 843-849.
Rainie L (2013) Cell phone ownership hits 91% of adults. *Pew Research Center Fact Tank.* Available at: http://www.pewresearch.org/fact-tank/2013/06/06/cell-phone-ownership-hits-91-of-adults/
Rainie L and Wellman B (2012) *Networked, the New Social Operating System*. Cambridge, MA: MIT Press.
Rheingold H (1993) *The Virtual Community: Homesteading on the Electronic Frontier*. Cambridge, MA: MIT Press.
Rheingold H (2008) Mobile Media and Political Collective Action. In Katz JE (Ed) *Handbook of Mobile Communication Studies*. Cambridge, MA: The MIT Press.

Shah DV (1998) Civic Engagement, Interpersonal Trust, and Television Use: An Individual-Level Assessment of Social Capital. *Political Psychology* 19(3): 469-496.

Shah DV, Kwak N and Holbert RL (2001) Connecting and Disconnecting with Civic Life: Patterns of Internet Use and the Production of Social Capital. *Political Communication* 18: 141-162.

Turkle S (2011) *Alone Together: Why We Expect More from Technology and Less from Each Other.* New York, NY: Basic Books.

Uphoff N (2000) Understanding social capital: learning from the analysis and experience of participation. In Dasgupta P and Serageldin I (Eds) *Social Capital, A Multifaceted Perspective.* Washington, D.C.: The World Bank.

Urry J (2007) *Mobilities*. Malden, MA: Polity Press.

Van den Hooff B, De Ridder J and Aukema E (2004) Exploring the Eagerness to Share Knowledge: The Role of Social Capital and ICT in Knowledge Sharing. In Huysman M and Wulf V (Eds) *Social Capital and Information Technology*. Cambrdige, MA: The MIT Press.

Wei R and Lo V (2006) Staying connected while on the move: Cell phone use and social connectedness. *New Media & Society* 8(1): 53-72.