



Relation Among ICT Usage and Bridging/Bonding Social Capital: The Moderating Role of Basic Human Values

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Received: 29 April 2021 / Accepted: 9 January 2025

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Abstract The study examines the relationship between involvement in the use of information and communication technologies (ICTs) and bridging/bonding social capital, taking into account the individual values of the respondent. We suggested that, according to Schwartz, individual values can act as moderators of the association between involvement in the use of ICTs and bridging/bonding social capital, i.e., respondents with different values may have different associations. The study was conducted online on a sample of 990 respondents. We found that involvement in the use of ICTs is positively associated with both types of social capital and two of the four highest-order values (“Self-Enhancement” and “Openness to Change”). These values are the effects of the relationship between involvement in the use of ICTs and social capital. People with high Self-Enhancement values are less likely to need ICTs to maintain their social capital. People with high values of Openness to Change, on the contrary, are more likely to use ICTs to maintain social connections and social capital.

Keywords Information and communication technologies · Basic human values · Bridging social capital · Bonding social capital · Moderation

Introduction

The development of information and communication technologies (hereafter ICTs) constructs a new social reality and serves as the basis for new social practices. Some researchers compare the magnitude of the impact of ICTs on society’s life with the revolution associated with the invention of the wheel and sail (Levashov et al., 2016).

Recently, there have been global changes in the technological context of communications due to the spread of ICTs and, in particular, the internet and social networks. Nowadays, social networks for many people act not only as a convenient way of communication, but also as an important source of information, a way to implement business, make purchases, and much more. At the same time, there is an increase in the mobility of communications due to the widespread implantation of mobile ICTs devices, namely smartphones, tablets, and other gadgets. As a result, the possibilities for information exchange and social interaction have been greatly expanded.

Social capital is one of the most important products of social interaction. According to Bourdieu, social capital is “an aggregation of actual or potential resources associated with the inclusion of mutual commitments or acknowledgments in strong networked or more or less institutionalized relationships.” (Bourdieu, 1985, p. 248). In other words, social capital is a positive effect of belonging to a community or social network.

The relationship between social capital and the development of information technologies is recognized by researchers (Yang et al., 2009), but the mechanism of this relationship often remains “vague,” and the direction of the relationship is ambiguous (Ahmed & Alzahrani, 2017).

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Social Capital at the Individual Level and Involvement in the Use of ICTs

Some of the research state the positive impact of the individual's use of ICT on his or her social capital. It was shown that ICTs can increase social capital due to facilitating the individuals' access to new information (Lin, 2001; Wellman et al., 1996) and constructing network infrastructure (Clark, 2003; Pierce & Lovrich, 2003). In addition, ICTs can enhance social capital by increasing the availability of social interaction (Collier, 1998).

It was found that the use of email has a positive impact on the development of individual social networks. In addition, it was found that the use of the internet is not associated with a reduction in the size of an individual social network, or the amount of time spent with your friends. (Franzen, 2000). Clark's experiment (2003), based on a case study of a Communication Technology Center, also showed that ICTs have the potential to increase users' social capital.

In one of the studies (Ellison et al., 2007) dedicated to the relationship between the social networks' usage, in particular Facebook, and social capital, a positive relationship was found. The usage of Facebook can provide special importance for people with low self-esteem and low life satisfaction. That is why it is important to note that individual personal characteristics can influence how an individual uses ICTs to accumulate social capital.

Another study emphasizes that the positive impact of ICTs on the growth of social capital can depend on such individual characteristics as education level, income, number of members in the household, as well as on the age of the individual (Bianchi & Robinson, 1997).

At the same time, other studies (Loch & Conger, 1996) show that the spread of ICTs can undermine social capital and contribute to the deindividualization of communication. At the same time, deindividualization is described as a feeling of alienation and detachment from society. In this particular case, the goal of ICTs' use is an important differentiating factor. For example, the use of ICTs for searching information or for communicating with others contributes to the strength of social capital and its growth. At the same time, the use of ICT for entertainment, for example, for games, can contribute to the detachment of a person from the real world and the destruction of their social capital (Rheingold, 2002; Srivastava, 2005).

Another negative impact of ICTs on social capital is that the use of ICTs, along with watching television, reduces the time people spend in face-to-face meetings (Putnam, 1995). It can lead to a weakening of private interpersonal communications that is usually expressed in a reduction of contacts with relatives, friends, colleagues, neighbors, as well as in a decrease in the involvement in communication with people who are geographically close (Hampton, 2001).

With regard to the spread of ICTs, the "phubbing" concept appears, meaning "the manifestation of another individual's neglect through attention's distraction to a gadget during real communication" (Kryukova & Ekimchik, 2019, p. 61).

It has been shown that ICTs can influence different forms of social capital in different ways. For example, ICTs can help strengthen bridging social capital and reduce bonding social capital (Wellman et al., 1996). Bridging social capital refers to in-group social ties while bonding social capital refers to social ties with representatives of outgroups.

It was also noted that the use of the internet does not in itself lead to an increase in sociability. Rather, those who actively use the internet already initially have a higher degree of social activity. This may be due to the fact that the internet is mostly accessible and actively used by young people with a relatively higher level of education and income (Nie, 2001).

Thus, existing research does not always show that involvement in the use of ICTs is unambiguously good for individual social capital, especially for its different forms, i.e., bonding and bridging social capital. Also, the available research does not take into account such individual factors as individual human values in the context of investigating the relationship between the involvement in the use of ICTs and social capital. Meanwhile, individual human values are factors that influence individual attitudes and their behavior (Schwartz, 2005, 2007). In this regard, it is important to consider the role of individual human values in the relationship between the involvement in the use of ICTs and individual social capital. This research is dedicated to how individual human values (Schwartz, 2007; Schwartz et al., 2012) influence the relationship between the involvement in the use of ICTs and individual social capital (the analysis of moderation). For this purpose, we will turn to the higher-order values, such as Self-Transcendence, Self-Enhancement, Conservation, and Openness to Change assessed in Schwartz's methodology (Schwartz, 2007; Schwartz et al., 2012).

Method

Sample

The total sample size is equal to 990 respondents (31.4% male), ranging in age from 15 to 72 ($M_{\text{age}} = 37.6$, $\sigma_{\text{age}} = 11.284$). About 62.8% of the respondents had a higher education, the rest had either vocational secondary or incomplete higher education (students). It is also important to note that in 2019, 76.9% of the respondents were employed and 87.1% of the respondents had an income above the established subsistence minimum.

Data Procedure

The research was conducted via such service online platform as 1KA. The link to the study was disseminated via social networks, such as VKontakte and Facebook. As part of the sociopsychological survey, the respondents were offered a block of questions regarding their involvement in the use of ICTs, followed by questions to assess the significance of individual human values for the respondents and questions about their sociodemographic characteristics, respectively. The questionnaire was filled out individually, without time limits and control by the researcher. The average time to complete the questionnaire was 30 minutes.

Research Tools

To assess the ICT usage, a special validated questionnaire was used (Tatarko et al., 2020). This methodology makes it possible to assess both the entire index of the involvement in the use of ICTs and its components, such as financial activity on the internet, communication via social networks, the use of smartphones, and the diversity of areas of ICTs' use. The methodology includes 16 items in a five-point Likert scale, anchored from "never" to "everyday." For example, "How often do you use electronic portals to receive government services (medicine, education, fines, taxes, documents, etc.)?"

The modified version of Schwartz's Portrait Values Questionnaire included in the European Social Survey was used for measuring individual human values. This questionnaire allows for assessing 10 basic human values ("Self-Direction," "Stimulation," "Hedonism," "Achievement," "Power," "Security," "Conformity," "Tradition," "Benevolence," and

"Universalism"), and includes 21 items (ESS-21) in a six-point Likert scale, anchored from "Not at all like me" to "Very much like me." Further, scores for four higher-order values ("Self-Transcendence," "Self-Enhancement," "Conservation," and "Openness to Change") are calculated on the basis of these 10 individual human values.

The Russian version of Williams's methodology for bridging and bonding social capital was applied for assessing social capital (Williams, 2006). This methodology makes it possible to assess the levels of "bonding" and "bridging" social capitals at the individual level. Each scale is measured by 10 items. Cronbach's alpha for each social capital's scale is greater than 0.7.

Sociodemographic parameters are presented by age, gender, the level of education, and the level of income.

Data Processing

The data analysis was carried out using the statistical software package SPSS 22.0 and the PROCESS plugin version 3.3. The analysis of moderation was applied for examining the relationship between individual human values and the involvement in the use of ICTs taking into account the respondent's age as a moderator of this relationship and controlling such sociodemographic respondent's characteristics as age, gender, the level of education, and the level of income.

Results

Table 1 presents an analysis of the relation between the engagement in information and communication technologies

Table 1 Predictor (ICT usage) and moderators (higher-order values) of bonding social capital

	Model 1 (moderator is Conservation)	Model 2 (moderator is Openness to Change)	Model 3 (moderator is Self-Enhancement)	Model 4 (moderator is Self-Transcendence)
	B (SE)	B (SE)	B (SE)	B (SE)
Constant	3.28*** (0.13)	3.35***	3.39***	3.38***
ICT usage index	0.22*** (0.06)	0.23***	0.26***	0.23***
Values ⁺	-0.10** (0.04)	-0.009	-0.12***	0.39***
ICT usage index × values	-0.07 (0.06)	0.06	-0.07	-0.17*
Gender	0.03 (0.03)	0.03	0.02	0.01
Education	0.04** (0.01)	0.04**	0.04**	0.04***
Income	0.02* (0.009)	0.02*	0.02*	0.02***
Age	0.001 (0.003)	0.001	0.002	-0.002
R ²	0.07	0.07	0.08	0.17
F-statistic	8.35***	7.26***	8.61***	22.12***

Note. Each of the four models represents the highest-order value that is indicated in the column

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

(ICT), and bonding social capital, taking values as moderators and controlling for the sociodemographic characteristics of the respondents.

As indicated in Table 1, the ICT engagement index has a positive and statistically significant association with bonding social capital. The values of Conservation and Self-Enhancement are negatively associated with bonding social capital, while the values of Self-Transcendence have a positive association. The moderating role of values only becomes statistically significant with the values of Self-Transcendence. The implication of the resulting moderation can be inferred from Table 2, which presents the conditional

effect of the predictor with certain values of the moderator (the Johnson–Neyman technique). Table 2 demonstrates that the effect of ICT usage on bonding social capital weakens and becomes statistically insignificant with increase in values of Self-Transcendence.

In other words, there is no relation between the use of ICT and bonding social capital among the respondents with higher values of Self-Transcendence. However, this relation exists among the respondents with lower values of Self-Transcendence.

Table 3 demonstrates the relation between the ICT engagement index and bridging social capital with

Table 2 The conditional effect of ICT usage index on bonding social capital at distinct values of “Self-Transcendence”

Self-Transcendence	Effect	SE (HCO)	<i>t</i>	<i>p</i>	LLCI	ULCI
-2.0476	0.6444	0.1976	3.2611	0.0011	0.2566	1.0321
-1.7679	0.5959	0.1767	3.3729	0.0008	0.2492	0.9426
-1.4881	0.5474	0.1560	3.5097	0.0005	0.2413	0.8534
-1.2083	0.4989	0.1356	3.6795	0.0002	0.2328	0.7649
-0.9286	0.4504	0.1157	3.8925	0.0001	0.2233	0.6774
-0.6488	0.4019	0.0966	4.1589	0.0000	0.2122	0.5915
-0.3690	0.3534	0.0790	4.4760	0.0000	0.1984	0.5083
-0.0893	0.3049	0.0638	4.7764	0.0000	0.1796	0.4302
0.1905	0.2564	0.0535	4.7932	0.0000	0.1514	0.3614
0.4702	0.2079	0.0509	4.0823	0.0000	0.1080	0.3078
0.7500	0.1594	0.0572	2.7870	0.0054	0.0472	0.2716
0.9334	0.1276	0.0650	1.9625	0.0500	0.0000	0.2552
1.0298	0.1109	0.0700	1.5853	0.1132	-0.0264	0.2482
1.3095	0.0624	0.0864	0.7224	0.4702	-0.1071	0.2319
1.5893	0.0139	0.1048	0.1328	0.8944	-0.1917	0.2195
1.8690	-0.0346	0.1242	-0.2783	0.7808	-0.2784	0.2092
2.1488	-0.0831	0.1444	-0.5755	0.5651	-0.3664	0.2002

Table 3 Predictor (ICT usage) and moderators (higher-order values) of bridging social capital

	Model 5 (moderator is Conservation)	Model 6 (moderator is Openness to Change)	Model 7 (moderator is Self-Enhancement)	Model 8 (moderator is Self-Transcendence)
	B (SE)	B (SE)	B (SE)	B (SE)
Constant	3.14***	3.24***	3.26***	3.27***
ICT usage index	0.38***	0.40***	0.42***	0.40***
Values ⁺	-0.18***	0.09**	-0.04	0.22***
ICT usage index × values	-0.08	0.16**	0.05	-0.16*
Gender	0.08*	0.06	0.05	0.04
Education	0.006	0.006	0.009	0.01
Income	0.01	0.01	0.01	0.02
Age	0.01*	0.003	0.002	0.001
R ²	0.13	0.12	0.11	0.14
F-statistic	15.41***	13.59	11.44***	14.85***

Note. Each of the four models represents the highest-order value that is indicated in the column

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

higher-order values taken as moderators when controlling for the sociodemographic characteristics of the respondents.

As indicated in Table 3, the ICT engagement index is positively associated with bridging social capital, as is the case with bonding social capital. In terms of values, the values of Openness to Change and Self-Transcendence are directly positively associated with bonding social capital, while values of Conservation demonstrate a negative relation.

The values of Openness to Change and Self-Transcendence have a moderating effect on the relation between ICT engagement and bridging social capital. The implication of the resulting moderation can be inferred from Tables 4 and 5, which show the conditional effect of the predictor with different values of the moderator. Table 4 indicates that the

relationship between the ICT engagement index and bridging social capital strengthens with increase in values of Openness to Change. In contrast, this relationship becomes weaker with increase in values of Self-Transcendence (see Table 5).

Accordingly, bridging social capital is low among the respondents at low values on the ICT engagement index. Bridging social capital becomes higher with an increase in ICT engagement and even higher for those with higher values of Openness to Change. At higher values of Self-Transcendence, the respondents also demonstrate higher values of bridging social capital (as is the case with bonding social capital). However, the relation between the ICT engagement index and bridging social capital becomes insignificant.

Table 4 The conditional effect of ICT usage index on bridging social capital at distinct values of “Openness to Change”

Openness to Change	Effect	SE (HCO)	<i>t</i>	<i>p</i>	LLCI	ULCI
-2.3649	0.0653	0.1481	0.4407	0.6595	-0.2254	0.3559
-1.7536	0.1544	0.1153	1.3399	0.1806	-0.0718	0.3806
-1.4621	0.1970	0.1004	1.9625	0.0500	0.0000	0.3939
-1.1423	0.2436	0.0850	2.8657	0.0043	0.0768	0.4105
-0.5310	0.3328	0.0613	5.4300	0.0000	0.2125	0.4531
0.0804	0.4220	0.0536	7.8721	0.0000	0.3168	0.5272
0.6917	0.5112	0.0677	7.5547	0.0000	0.3784	0.6439
1.3030	0.6003	0.0942	6.3742	0.0000	0.4155	0.7852
1.9143	0.6895	0.1255	5.4942	0.0000	0.4432	0.9358
2.5256	0.7787	0.1588	4.9036	0.0000	0.4671	1.0903
3.1369	0.8679	0.1931	4.4953	0.0000	0.4890	1.2468
3.7482	0.9571	0.2279	4.2004	0.0000	0.5099	1.4042

Table 5 The conditional effect of ICT usage index on bridging social capital at distinct values of “Self-Transcendence”

Self-Transcendence	Effect	SE (HCO)	<i>t</i>	<i>p</i>	LLCI	ULCI
-2.0476	0.7773	0.1867	4.1639	0.0000	0.4110	1.1436
-1.7679	0.7331	0.1675	4.3753	0.0000	0.4043	1.0619
-1.4881	0.6888	0.1486	4.6348	0.0000	0.3972	0.9805
-1.2083	0.6446	0.1300	4.9593	0.0000	0.3895	0.8996
-0.9286	0.6003	0.1118	5.3717	0.0000	0.3810	0.8196
-0.6488	0.5561	0.0942	5.9020	0.0000	0.3712	0.7410
-0.3690	0.5118	0.0778	6.5772	0.0000	0.3591	0.6645
-0.0893	0.4676	0.0634	7.3700	0.0000	0.3431	0.5921
0.1905	0.4233	0.0528	8.0209	0.0000	0.3198	0.5269
0.4702	0.3791	0.0483	7.8417	0.0000	0.2842	0.4739
0.7500	0.3348	0.0518	6.4688	0.0000	0.2333	0.4364
1.0298	0.2906	0.0617	4.7062	0.0000	0.1694	0.4118
1.3095	0.2463	0.0757	3.2524	0.0012	0.0977	0.3950
1.5893	0.2021	0.0919	2.1982	0.0282	0.0217	0.3825
1.6673	0.1898	0.0967	1.9625	0.0500	0.0000	0.3795
1.8690	0.1578	0.1094	1.4434	0.1492	-0.0568	0.3724
2.1488	0.1136	0.1275	0.8910	0.3732	-0.1366	0.3638

Discussion

This study demonstrates that ICT engagement is positively associated with both bonding and bridging social capital. These results support previous studies (e.g., Ellison et al., 2007) which indicate that the use of ICT can bolster individual social capital. In addition, previous studies have indicated that ICT may help strengthen bridging social capital and reduce bonding social capital (Wellman et al., 1996). This study found a positive correlation between ICT engagement and both types of individual social capital.

The most important finding from this research is the role played by the values of the individual in this regard. In this study, the so-called higher-order values (according to S. Schwartz) were used as moderators. Higher-order values are larger general blocks of values that unite the more private interrelated values of an individual. The results of this study indicate that some values affect the correlation between ICT engagement and both types of social capital, while others do not.

From Tables 1 and 3, we see that the values themselves are also directly related to both types of social capital. In particular, values of Conservation are negatively associated with both bonding and bridging social capital, while values of Self-Enhancement only have a negative association with bonding social capital. Additionally, values of Self-Transcendence are positively associated with both bonding and bridging social capital, while values of Openness to Change are positively associated with bridging social capital. Accordingly, we can say that the values of an individual may either impede the accumulation of social capital (values of Conservation and Self-Enhancement) or, conversely, facilitate it (values of Self-Transcendence and Openness to Change).

However, these core values are not only linked to social capital but also have a certain effect on the correlation between ICT engagement and the two types of individual social capital. The values of Self-Transcendence play the primary moderating role. This study indicates that the positive correlation between ICT engagement and both types of social capital become weaker and insignificant if these values are high.

The values of Self-Transcendence involve an orientation toward others. However, online communication is more formal than face-to-face communication. Therefore, individuals who are more oriented toward others may not be as inclined to use the electronic communication format to accumulate and maintain social capital.

As we have seen, active use of ICT contributes to the maintenance of bridging and bonding social capital, but only among people with low values of Self-Transcendence. Orientation toward others and, consequently, contact with others is higher among the respondents with high values

of Self-Transcendence, and ICT engagement does not fundamentally alter the picture. People with low values of Self-Transcendence are more likely to use ICT to maintain social capital because the emotional side of the relationship is less important to them. They likely use ICT as a means for maintaining a large number of “weak” bonds, rather than “strong” ones (Granovetter, 1973).

This study also demonstrates that the correlation between ICT engagement and bridging social capital will be stronger given higher values of Openness to Change. That is, people who expressed values of orientation toward change demonstrate a stronger correlation between the frequency of ICT use and having a wider circle of contacts. With high values of Openness to Change, people who actively use ICT have a higher bridging social capital, involving “weak” ties, mainly acquaintances. This resource is required for progress and success, and people with high values of Openness to Change actively use ICT to establish and maintain this resource.

Conclusion

The results of this study demonstrate that the engagement of Russians in information and communication technology is positively associated with bridging and bonding social capital at an individual level. Additionally, these types of social capital are interrelated with higher-order values that may either facilitate the accumulation of social capital (Openness to Change and Self-Transcendence) or, on the contrary, prevent it (Conservation and Self-Enhancement). Most importantly, this study indicates that two of the four higher-order values (Self-Transcendence and Openness to Change) affect the correlation between ICT engagement and social capital.

The use of ICT has a positive effect on both bridging and bonding social capital, but it can also interact with several human values that are quite important personality traits. As such, the impact of ICT on social capital may be “refracted” through some individual values. In particular, people with high values of Self-Transcendence have a lower need for ICT to maintain their social capital. On the contrary, people with high values of Openness to Change are more inclined to use ICT to maintain social ties and social capital.

As digitalization penetrates more spheres of life, we can assume that it will also influence our values. In particular, the degree to which we value Openness to Change will increase. As a consequence, we will increasingly use ICT to maintain social contacts, giving preference to ICT over face-to-face communication. This may increase the number of “weak” ties and reduce the number of “strong” ties of a given individual.

Authors' contributions The authors' contribution to this study and the manuscript is equal approximately.

Funding This work was supported by grant Russian Science Foundation (Grant Number 24-18-00119).

Availability of Data and Material We attach a complete data file, as well as a syntax with keys to the scales.

Code Availability The data was processed using the PROCESS macro (for SPSS). So we do not have a separate code that we can attach.

Declarations

Conflicts of interest The authors declare that there is no conflict of interest.

Ethics Approval All procedures performed in the studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards (include appropriate approvals or waivers).

Consent to Participate Informed consent was obtained from all individual adult participants included in the study.

Consent for Publication All of the authors listed in the byline have agreed to the byline order and to submission of the manuscript in this form and publication of this manuscript.

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