Studying structural social capital in urban networks in relation to behavior and communication on social media

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SCILA Digital Friends project
Social capital and online privacy: the urban community in a social networking site

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Internet and social capital: isolation argument

Bowling Alone (Putnam, 2000): solidarity is cultivated through participation in shared environment community organizations, it leads to more health society

Spread of media isolate individuals and fragments the social connections

Internet - friend or foe?

-taking time away from "offline" activities (Nie et al., 2002)

-increased connectivity within the personal network (Quan-Haase and Wellman, 2004; Network individualism (Raini& Wellman, 2012)

Individual online social capital in CMC

RQs	Theoretical assumptions / mechanisms	Some findings (focused on networks)
How social media usage relates to social capital outcomes depending on: -expected gratifications/goals (why) -communication patterns on site (how) -personality traits (who) -network composition (with whom)	-SNS affordances (Boyd, Donah, Ellison, Marwick, Vitak etc.) -Uses& Gratification theory (Katz, 1974) -Social enhancement/Social compensation hypotheses (Toma, 2022) -Self-disclosure theory (Altman& Taylor, 1973)	• Active and "open" SNS usage associates with higher social capital (Rykov et al., 2020; Ellison et al., 2014; Brooks et al., 2014; Liu, 2019) • Number of actual friends (Ellison et al., 2011) and perceived network diversity (Vitak, 2012) positively predict users' perceptions of social capital • SES was not associated with number of cliques, but rather a larger and more dense online network (Brooks et al., 2011) • Found structural and behavioral correlates of perceived SC in online ego-networks (Brooks et al., 2014)

Aim

to investigate the role of communication on social media in social ties formation

- How people communicate online and how it affects their social connections?

- How people balance networking online and keeping privacy?

Contribution of the present research to CMC literature

Privacy paradox debate

- "Privacy paradox": discrepancy between privacy needs and actual behavior online (Norberg et al., 2007; Taddicken, 2014)

- No paradox - those who concerned, protect their privacy online by privacy settings restrictions (Chen& Chen, 2015), reducing self-disclosures (Zlatolas et ., 2015), self-censorship (Das&Kramer, 2013)

- No paradox – privacy calculus, rational exchange between need for privacy and social media gratifications (Taddicken& Jers, 2011) or social outcomes (Dienlin & Metzger, 2016)

Social capital (SC) – complex term

- Collective vs Individual

- Local vs Global

- Resources vs Networks

- Self-reported vs Observational SC

Individual Social Capital in CMC studies

SC (Lin, 1999, p.35):
«investments into relationships granted access to resources embedded in a social structure for mobilization in purposive actions»

BONDS

family, close friends, people who share our culture or ethnicity

BRIDGES

distant friends, colleagues, associates

Individual Social Capital in CMC studies

SC (Lin, 1999, p.35):

communication

resources

«investments into relationships | granted access to resources

networks

embedded in a social structure

action

for mobilization in purposive actions»

Bonding & bridging social capital (Putnam, 2000):
emotional and material resources (strong ties)
new information and experiences (weak ties)

BONDS
family, close friends,
people who share our
culture or ethnicity

BRIDGES
distant friends,
colleagues,
associates

Contribution of the present research to SC literature

- Testing new mechanism in explaining users' social capital difference: role of privacy attitudes and behaviors as an individual communication preference

- Multilevel and theory-diverse approach to the conceptualization and measuring social capital in online networks:

-SC situated within meaningful macro social structure (Lin, 2002):

trace the offline urban social structure based on the online friendship data -> city-embedded social capital (Hampton & Wellman, 2003)

-combine resource and network SC paradigms

Research model (SEM)
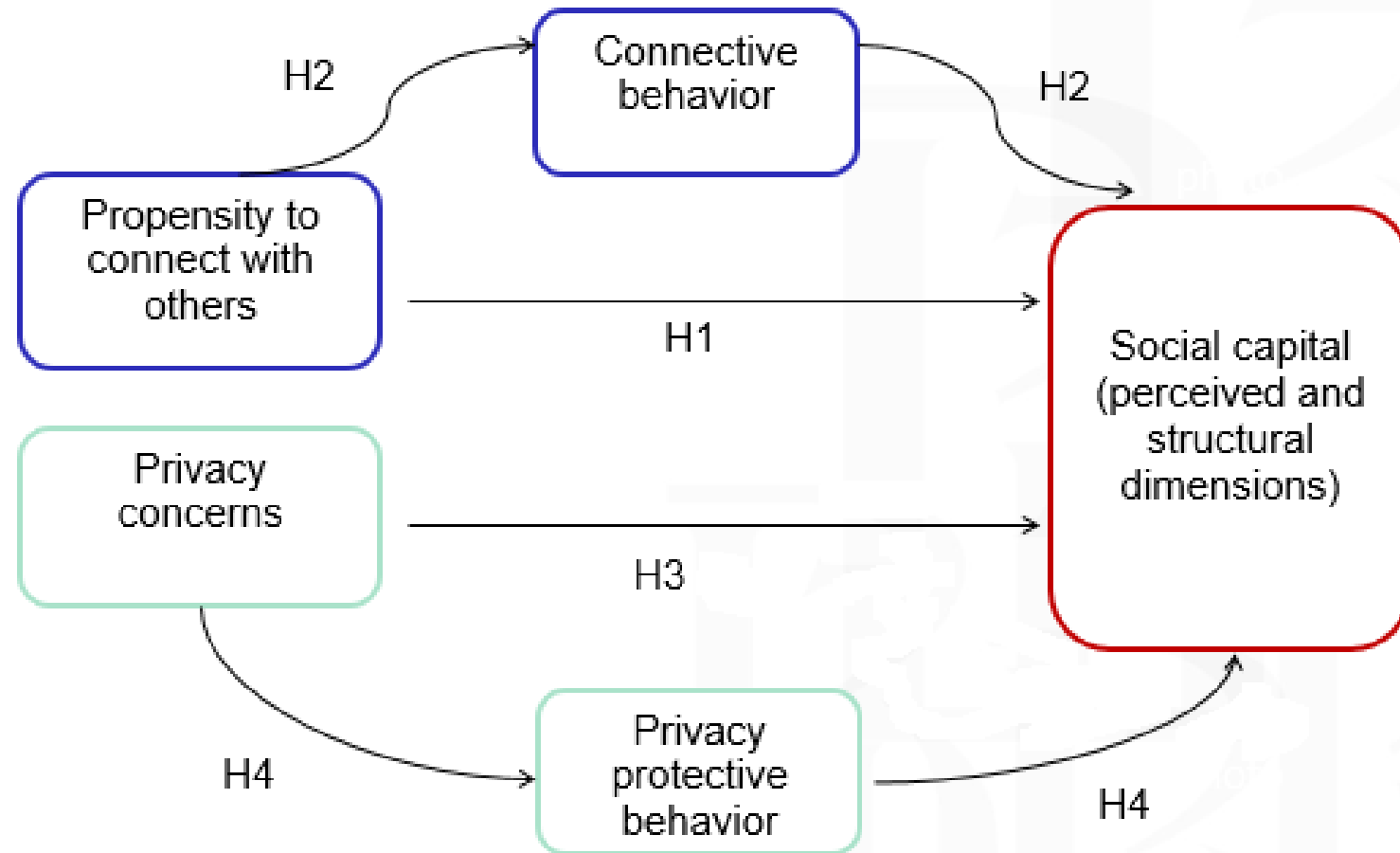
Data and procedure
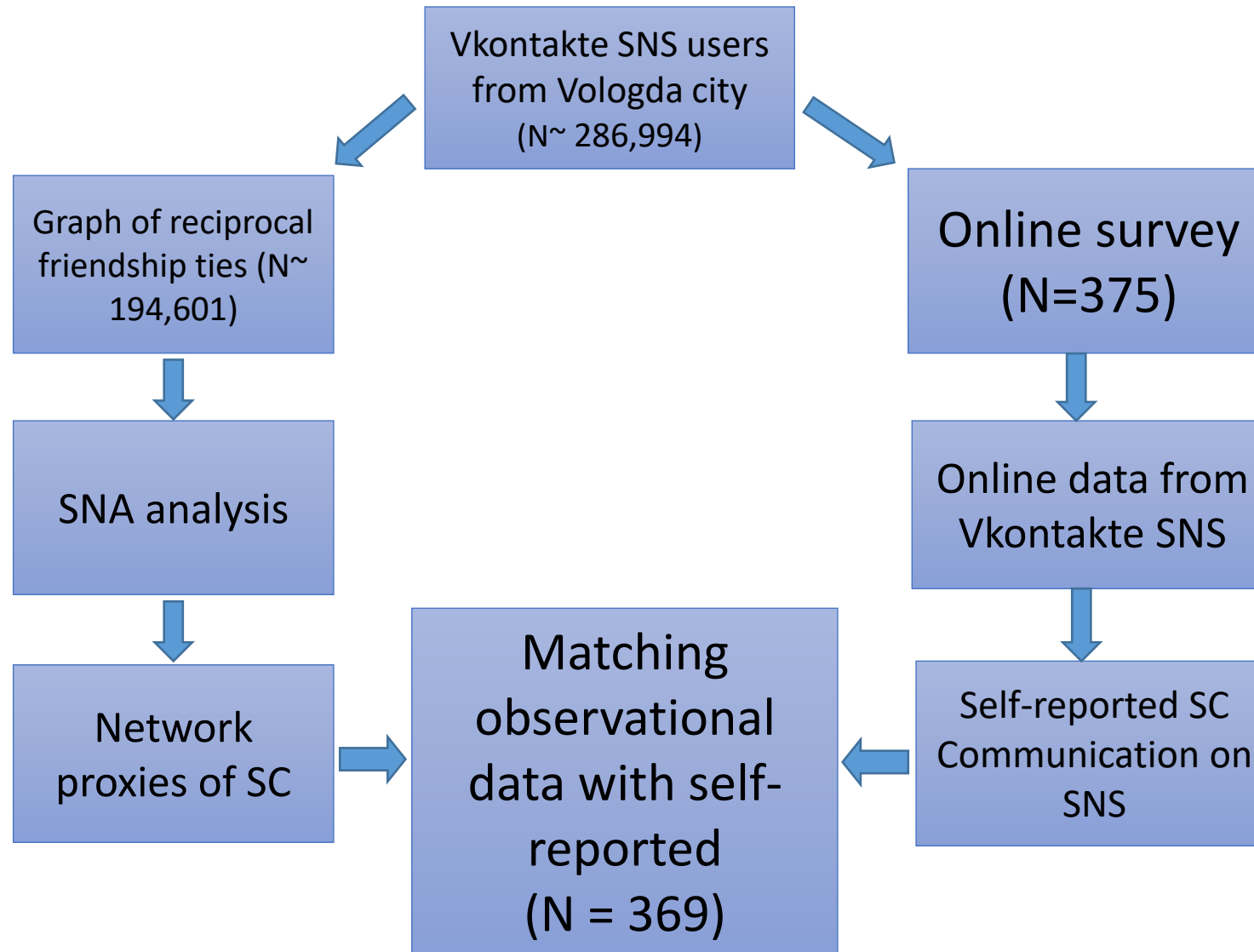
Vologda friendship graph

Kaveeva&Gurin, 2018

Metrics	VK graphs		Random graph models		
	Vologda (giant component)	Izhevsk	Erdos-Renyi	Scale-free	Small World (p = 0.3)
Nodes	196,630	477,057	196,630	196,630	196,630
Edges	9,800,077	17,742,662	9,800,077	9,830,225	9,831,500
Density	0.000507	0.000155	0.000507	0.000508	0.000508
Average degree	99.680	74.384	99.680	100	99.987
Connected components	1		1	1	1
Diameter	9		4	4	4
Average geodesic distance	3.15546	3.590	2.957603	2.889812	2.998528
Transitivity (global clustering coefficient)	0.080921	0.090	0.000508	0.003621	0.087468
Average clustering coefficient (Watts-Strogatz)	0.130105		0.000508	0.003529	0.088209
Average aggregate constraint	0.065472		0.010144	0.013402	0.011962
Centralization degree	0.033852		0.000245	0.022046	0.000168
Centralization betweenness	0.011070		0.000012	0.006248	0.000009
Assortativity by degree	0.140230	0.162	0.000289	0.003023	0.000017
Modularity	0.362820	0.377	0.070148	0.084263	0.361638
Clusters	21		8	9	4

Arnaboldi et al., 2012

Measures

- Observational Structural social capital:

5 SNA metrics characterizing structural position of a person in a city networks (degree, betweenness, closeness, eigenvector, transitivity)

- Self-reported data:

– Internet social capital scale (Bonding&Bridging) (Williams, 2006)

– Adopted Relationship maintenance scale (RM) (Ellison et al., 2007)

– Propensity to make connections scale (PCO) (Totterdell et al., 2007)

– Privacy concerns scale (PC) (Stutzman et al., 2012)

Online data on privacy settings usage from VK accounts:

- Privacy protective behavior index (PPB) (0-7)

Controls: time in VK, well-being

Networks mechanism of SC

Based on structural patterns (how people relate to each other in networks)

Network closure (Burt, 2005) – geodesic distance as a cohesiveness of network structure, homophily, close ties

Structural holes (Burt, 1992, 2005) - bridging structural position on a network as a source brokerage, informational diversity

Context-based value (Lin, 1999):

- Homeostasis is better kept in tightly-knit communities
- Innovations and new resources are obtained outside the primary community

Structural social capital

| **Brokerage capacity, bridging ability**	Degree	Number of friends in the city network; general crude indicator of SC
	Betweenness centrality	Number of shortest paths through the node in the city network (Freeman, 1977): indicates brokerage capacity
Reachability, Mobilizing resources	Eigenvector centrality	Relative score of a node's centrality that depends on centralities of the node's neighbors in the city network (Bonacich, 1972); indicates ability to mobilize resources through connectedness to well-connected others
	Closeness centrality	Inverse of the sum of all shortest paths to other vertices. A proxy of how fast it will take to spread information to all other nodes and mobilize resources through the proximity to all other nodes in the city network
Embeddedness in a network with closure	Transitivity	Ratio of the number of all closed triads adjacent to an ego to the overall number of triads adjacent to this ego (Wasserman & Faust, 1994); indicator of network closure, measured as local clustering coefficient
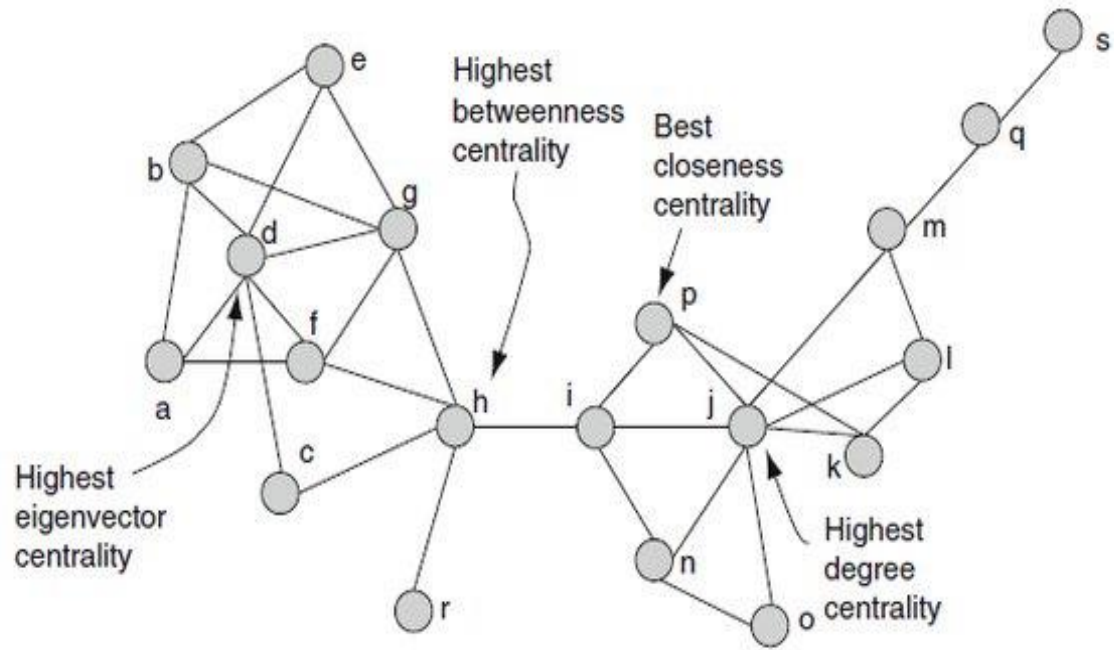
From Alberto Manuel's End to End BPM blog
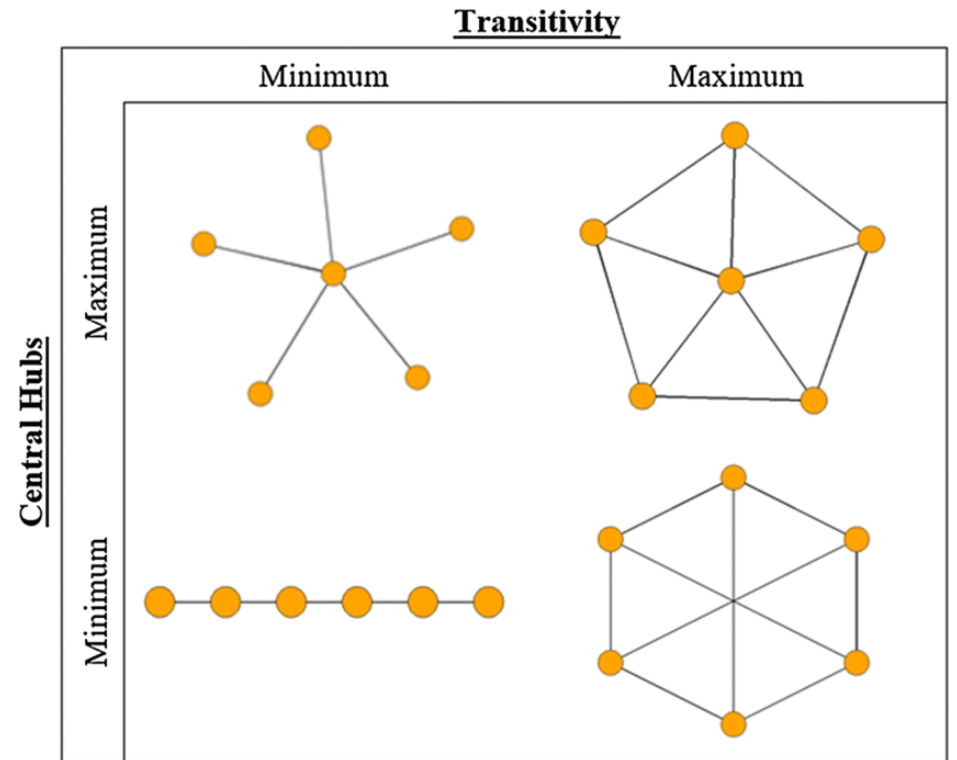
interrelation of structural SC measures

- Closeness and eigenvector centralities – extremely correlated (r = 0.97), the former was excluded

- In line with other studies (Valente et al. 2008; Batool & Niazi, 2014): betweenness, eigenvector are strongly related to a simple degree metric

- Use SC as two dimensions in the models (based on PCA):

1 - Degree-related SC component (degree, betweenness & eigenvector)

2 - Transitivity SC

Results-1 relation of structural and perceived SCs

- Weak positive correlation between bonding SC and transitivity, while negative with degree-related SC

- Not related directly, but related through the other factors

Results-2: SEM model of SC factors
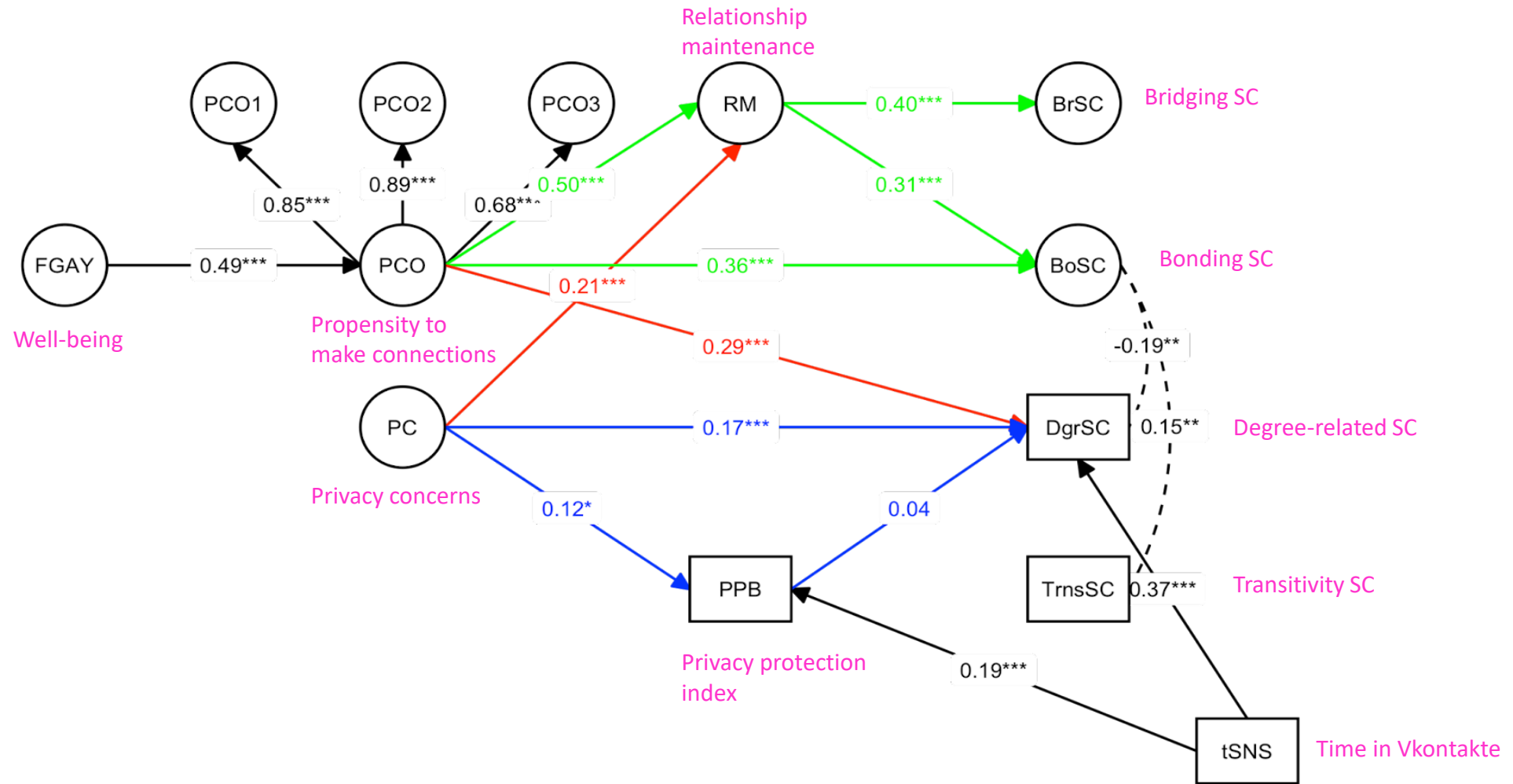
(Fit statistics: χ2=586, df =418, CFI=0.949, TLI=0.943, RMSE=0.033, SRMR=0.049)

Results-2: factors of SC

- *Attitudes* toward social networking and privacy protection are the bridging factors between two types of social capitals:

those who intend to develop social connections and have more privacy concerns possess higher centrality in city network and perceive higher access to bonding/bridging recourses

- *Attitudes are "supported" by the respective behavior, but only for social networking (not privacy protection)*

those who intend to develop social connections engage heavily in interpersonal communication with the network and by this possess higher perception of social capital

- Preferential attachment effect does matter:

the old residents of Vkontakte tend to have higher centrality and more capable to protect privacy

TAKEAWAY-1

- Global city-level centralities could be reduced to a simple degree measure in our analysis

- Other different types of social capital irreducible to each other: perceived (1) bridging and (2) bonding capitals, embeddedness in a network with closure (transitivity) (3), and a concept reflecting ego-network size (4)

- Network social capital does not predict the perception of resources available, but they are determined by the same factors

TAKEAWAY-2

- The own motivation for developing social connections associates with higher investment in relationships and then with higher perception of resources; it also indicates the more central position in the city network

- Privacy concerns and privacy restrictions do not prevent from gaining social capital

Limitations

- Approximation of offline social ties by online data: could be over- or underestimated either due to duplicated accounts or anonymous accounts respectively

- Using network data for SEM: non-independent observations, but the sample is of 0.2% of general population, reduce the probability of users being connected

Thank you for attention!

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Empirical case: Vkontakte SNS users from Vologda city

- Vkontakte social networking site - most popular in Russia by the 2017

- Vologda city:

-middle-sized Russian city Vologda (offline population 313,012)
-average level of economic development (38 out of 85 Russian regions by GRP (Rosstat, 2017)
-average level of Internet penetration, as of 2017 (Fund Public Opinion, 2018)

-limiting migration flow

Survey measures of SC

Internet social capital scale, 20 items (Bonding & Bridging SC) (Williams, 2006)

Bonding Subscale (examples)

There is someone online I can turn to for advice about making very important decisions

The people I interact with online would be good job references for me

Bridging Subscale (examples)

Interacting with people online/offline makes me interested in things that happen outside of my town.

Interacting with people online/offline makes me feel like part of a larger community.