

Prefecture-level Social Capital in Japan: An Interdisciplinary Perspective

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Abstract

Taking a holistic and interdisciplinary approach, this study examines prefecture-level social capital in Japan in terms of its relationships with numerous variables including demographic, environmental, public health, and socio-economic indicators. The ecologic study design was adopted whereby regression analyses and Spearman's Correlation Coefficient were carried out to appraise the goodness of fit and inter-variable relationships.

The results illuminated the relative fitness and negative correlation between bonding social capital, on the one hand, and the "Ratio of never-married population (male; 30-34 years of age)" as well as that for never-married males in the age bracket of 45 to 49, respectively, on the other. In effect, the former variable, males in the age bracket of 30 to 34, showed the highest values both in terms of R^2 and r_s . Moreover, from the perspective of public health and safety, the results between bonding social capital and "Ratio of felonies to criminal cases" were also critical for their potential applicability for effective public policy planning. It is also remarkable that "Ratio of psychiatric patients per full-time physician" was the only variable that resulted in a notable outcome with bridging social capital, out of the total of 429 variables.

1. Introduction

Social capital is a concept which can be utilized as a proxy representing the strength or the weakness as well as the size of the network—i.e., the degree and the range of both formal and informal inter-relationships people formulate in everyday life. It was Robert D. Putnam, a political scientist at Harvard University, who, in 1995, disseminated the concept first to the academic community, through his renowned article entitled *Bowling Alone* which later became the title of his book (Putnam). Today, the concept is accepted and applied in various fields and disciplines.

It is generally accepted that there is a differentiation to be made in analyzing social capital. Horizontal social capital, on the one hand, *bonds* homogenous people—thus it is also called *bonding social capital*. In other words, it connects people with similarities, such as residents in a community with comparable socioeconomic characteristics. On the other hand, vertical social capital *bridges* people(s) of heterogeneous characteristics, crossing the boundary of social divides, such as those manifesting in dissimilar socioeconomic status. Hence, this latter kind is also called *bridging social capital*; i.e., metaphorically, it functions as a “bridge” to connect people(s) of different traits.

It is noteworthy that social capital has attracted a lot of attention in recent years due to the unprecedented rise in the recognition of its potentially critical role in enhancing individual, social and/or economic well-being (Uchiyama and Kawabata). For instance, in 2012, the World Health Organization’s European Regional Office published a study on 14 European countries in which it was found that individual-level social capital had a strong causal relationship with the health of the individual participants (Rocco and Suhrcke). Moreover, as a funding entity of the United Nations, the World Bank has been active in disseminating the usefulness of social capital and is funding 20 projects as of 2014, for the purpose of refining the definition and the measurement of social capital (The World Bank). Furthermore, many scholars and researchers in recent years, such as Ichiro Kawachi, have turned social capital into a concept that can neither be neglected nor ignored in numerous fields. In short, social capital has increasingly gained its significance among scholars and researchers as an important factor to consider for not only regional, but also global well-being and development.

In this study, social capital is examined with an interdisciplinary perspective, since the concept per se is a broad and multidisciplinary one and thereby necessitates and benefits from such an approach. The author examines prefecture-level social capital in Japan, analyzing the relationships with a holistic list of variables, including demographic, socio-economic, socio-environmental indicators, and factors pertinent to criminology, education, and public health.

2. Method

Data from two sources are utilized in this study. The first data set consists of data surveyed by the Japan Research Institute, Limited, in collaboration with Osaka University. In 2007, an extensive national survey on social capital was carried out in Japan, and its data are administered and are available (as of 2014) through the Social Capital Archives at Osaka University’s School of International Public Policy (Social Capital Archives).

From the collected data, social capital indices have been calculated and are provided by the Social Capital Archives. In this study, the data and information specific to prefecture-level social capital indices are fully utilized. Namely, the indices for three types of social capital—that is, (1) bonding, (2) bridging, and (3) comprehensive, which is both bonding and bridging combined—are drawn from this data source (The Japan Research Institute, Limited).

The second data source is entitled Statistical Observations of Prefectures (Statistics Bureau Japan). It is a collection of nationwide prefecture-level data administered by the Statistics Bureau of the Ministry of Internal Affairs and Communications, Japan. The broad data can be categorized into public health, social, or sociological taxa—such as those related to public safety, socio-economics, and social medicine—as well as demographic, education, and environmental or geographical categories, to name only a few. In total, 429 variables from this source are analyzed in relation to the aforementioned three types of social capital indices for each prefecture. Whenever available, the data from the year 2007 were used, as such were used for the social capital indices; however, if 2007 data were not at disposal, data from the year closest to 2007 was selected for the analysis.

Utilizing these data sets, an ecologic study design, in which all of the data sets are at the group—or, in this case, the prefecture—level, is adopted to examine relationships between social capital and variables in a number of categories. Specifically, three types of prefecture-level social capital variables—namely, of bonding, bridging, and comprehensive—are employed as explanatory variables in regression analyses. The regression analyses were implemented in order to assess these social capital variables' goodness of fit with dependent variables, which are those corresponding prefecture-level variables in the aforementioned categories. To assess the relationships, Pearson Product-Moment Correlation Coefficient is first calculated to tally the r value, and then squared. The formula applied to appraise the R^2 is as seen below:

$$R^2 = \left(\frac{\sum (x - \bar{x})(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}} \right)^2$$

Utilizing the above formula, the R^2 is calculated for every set of variables to assess goodness of fit between each.

Subsequently, for variables displaying relatively high degrees of goodness of fit ($R^2 \geq 0.2$) or are reckoned anomalous and deserve special attention—and thus inclusion in the additional testing—Spearman's Correlation Coefficients were carried out in order to assess associations between social capital variables and the given variables. The formula

is as follows:

$$r_s = 1 - \frac{6 \sum d^2}{n(n^2 - 1)}$$

2.1 Participants

The first data set, from which social capital indices derive, contains information from 3,000 respondents, randomly selected from 47 prefectures throughout Japan. Of the 3,000 people, 1,500 or exactly 50% are male, while the other half or 50% are composed of 1,500 female respondents. The mean age of the respondents is 40 years, while the lowest being 15 years and the highest 81 years. The respondents' occupations varied: company workers in the private sector represented 40%, homemakers 20%, part-time workers 12%, self-employed 9%, public servants or teachers 6%, currently unemployed 5%, students 5%, and the last category encompassing managers, proprietors, company committee members or others, accounted for approximately 3%.

The second data set, which is from Statistical Observations of Prefectures, derives mainly from Japan's national census carried out by the government of Japan. The census aims to gather information on and for the entire population of Japan, which, in 2007, composed approximately 127,771,000 people of whom 62,310,000 individuals or 49% were male, and 65,461,000 constituents or 51% were female (Statistics Bureau Japan¹). The criteria for selecting the respondents in the survey are that they should be people who regularly reside in Japan, including people from foreign countries who had lived in Japan for more than three months or who would be expected to live in Japan for more than three months at the time of the survey (Statistics Bureau Japan²). Nonetheless, certain individuals such as students living in dormitories, regularly hospitalized patients, and seafarers were excluded from the survey. Having been collected throughout Japan, the individual data, in many cases, were then processed into prefecture-level data by the Statistics Bureau—the products of which are utilized herein.

3. Results

In total, 429 variables have been tested individually and appraised in terms of their relations with each of the three types of social capital variables. Of the 429 variables, it turned out that 25 variables resulted in the R^2 values equal to or greater than 0.15, which was used as the cut-off point for the first stage of the analyses. Table I shows the results

of variables in the social category with the R^2 values equal to or higher than 0.15 and its counterparts in other social capital types. For instance, the variable “Average monthly salary” resulted in the R^2 value of 0.20 for bonding social capital; hence, in this case, the results for the variable are shown not only in terms of bonding social capital, but also in relation to bridging and comprehensive social capital for the purpose of comparison, despite the fact that the latter two’s R^2 values are lower than 0.15.

■ **Table I: Social variables with the results, $R^2 \geq 0.15$, and their SC counterparts**

Variable Category	Variable	Bonding SC	Bridging SC	Comprehensive SC
Public Health Services	Ratio of psychiatric patients per full-time physician	0.01	0.19	0.07
Public Safety	Ratio of felonies to criminal cases	0.28	0.00	0.03
Socio-economics	Average monthly salary of females	0.20	0.00	0.06
	Number of cars per 1,000 households	0.15	0.06	0.01
	Ratio of the newly employed to high school graduates	0.21	0.00	0.00

As seen in Table I, the variables in the social category yielded five indicators transcending the cut-off value of 0.15. Of the five variables, however, it is remarkable that only one variable in relation to bridging social capital exceeded the cut-off point. It is only this one variable “Ratio of psychiatric patients per full-time physician” that resulted in an R^2 value equal to or greater than 0.15 in relation to bridging social capital; in contrast, bonding social capital accounted for four out of the five variables shown on the table. Specifically, “Ratio of felonies to criminal cases,” “Average monthly salary of females,” “Number of cars per 1,000 households,” and “Ratio of the newly employed to high school graduates” all resulted in R^2 values equal to or greater than 0.15, in relation to bonding social capital.

Table II shows the results for the next category, that of demographics. This category resulted in more qualifying R^2 values—equal to or greater than 0.15—than any other single category: 11 variables in total for this taxon alone. However, it is important to point out that eight of the 11 variables relate to marriage, or more precisely being single or widowed. Of the rest, two variables are pertinent to age, while the other variable is “Ratio of people from the United States per 100,000 persons.”

■ **Table II: Demographic variables with the results, $R^2 \geq 0.15$, and their SC counterparts**

Variable Category	Variable	Bonding SC	Bridging SC	Comprehensive SC
Demographics	Population by sex (all ages)	0.16	0.03	0.09
	Ratio of households with members who are 65 years of age or older	0.17	0.01	0.04
	Ratio of never-married population (male)	0.17	0.00	0.07
	Ratio of never-married population (male; 30-34 years of age)	0.31	0.01	0.17
	Ratio of never-married population (male; 35-39 years of age)	0.19	0.04	0.18
	Ratio of never-married population (male; 40-44 years of age)	0.18	0.01	0.12
	Ratio of never-married population (male; 45-49 years of age)	0.22	0.01	0.13
	Ratio of never-married population (female; 45-49 years of age)	0.15	0.02	0.04
	Ratio of people from the United States per 100,000 persons	0.18	0.01	0.07
	Ratio of population between 15 and 64 years of age	0.15	0.00	0.06
	Ratio of widowed population (female; 60 years of age or older)	0.19	0.00	0.07

Table III lists results of Spearman’s Correlation Coefficient conducted for selected variables that have either the R^2 values higher than 0.20 or are deemed particularly relevant for inclusion because of anomalous properties, based on the preceding regression analyses. Only six variables qualified for the tests. If a variable showed a high R^2 value (≥ 0.20) in relation to, e.g., bonding social capital, the correlation coefficient is then calculated between the variable and bonding social capital. Corresponding with the result of the regression analysis, “Ratio of never-married population (male; 30-34 years of age)” turned out to have the highest absolute value; hence it is the most prominent result of all variables. See Table III for the results.

- **Table III: Results of Spearman’s Correlation Coefficient;** for variables with the preceding regression analyses with the results of $R^2 \geq 0.20$ or are considered anomalous and especially relevant; all except the variable marked * are tested with bonding social capital; the variable marked * is examined for its relation with bridging social capital.

Variable	Spearman's Correlation Coefficient	P value
Average monthly salary of females	-0.475	< .001
Ratio of felonies to criminal cases	-0.502	< .001
Ratio of never-married population (male; 30-34 years of age)	-0.607	< .001
Ratio of never-married population (male; 45-49 years of age)	-0.413	< .005
Ratio of the newly employed to high school graduates	0.510	< .001
Ratio of psychiatric patients per full-time physician*	-0.425	< .005

Discussion

Of all the results from the social category as shown in Table I, the relative high R^2 value ($R^2 = 0.28$) between bonding social capital and the “Ratio of felonies to criminal cases” is noteworthy. Pertinent results have been noted in the past decade in particular, since studies scrutinizing associations between social capital and crime rates abound. For example, Akcomak and Weel carried out a study on the impact of social capital on crime in the Netherlands. They found a significant relationship between higher levels of social capital and lower crime rates (Akcomak and Weel). Likewise, in Italy, Buonanno et al. reported in their study that there was a negative effect of civic norms and associational networks on property crimes (Buonanno et al.).

The present study, conducted in Japan, found that only bonding social capital showed a relatively high R^2 value, and not its counterparts in bridging ($R^2 = 0.00$) and comprehensive ($R^2 = 0.03$) social capital. Nevertheless, the high R^2 value between bonding social capital and the “Ratio of felonies to criminal cases” observed in this study in itself is remarkable. It could be interpreted as a convincing indication that bonding social capital—somewhat synonymous with the term social cohesion—within a community is a key element in reducing crime rates. Hence, it is suggested that devising ways to enhance bonding social capital within communities by means of *de facto* social practices/norms or, if possible, *de jure* public policies or strategies would be highly beneficial in terms of community safety.

Of all the analyses in this study, the only variable bringing about the R^2 value equal to or greater than 0.15 in relation to bridging social capital is the “Ratio of psychiatric patients per full-time physician,” whose R^2 value is 0.19. Though this value per se is not spectacularly high, the result is exceptional and anomalous, when compared with other outcomes involving bridging social capital in this study, which turned out to be consistently low. Moreover, this value seems to stand out even further when its corresponding results in R^2 values for bonding and comprehensive social capital are taken into consideration: 0.01 for the former, and 0.07 for the latter, both of which are low.

For the second categorical group—that of demographics—the results seem consistent and clear. (See Table II.) That is, social capital and marriage for males are closely interlinked and influence each other. For males in the age bracket of 30 to 34 ($R^2 = 0.31$), this tendency is more conspicuous than any other age bracket. Moreover, there are also other age brackets for males that had relatively high R^2 values in comparison with many other variables, but that did not make it to the table.

The final analyses utilizing Spearman’s Correlation Coefficient highlighted some intriguing outcomes. The first item on the list “Average monthly salary of females” shows a moderately high negative correlation: $r_s = -0.475$ ($p < .001$). This negative correlation was somewhat surprising at first, due to the presumption that a person with a higher salary would also likely have a higher level of social capital than another with a lower salary. However, this preconceived notion is certainly an overgeneralization.

In contrast, it seems logical and plausible to conjecture that women working to earn a higher salary away from home tend to spend less time socializing in the community where they live, which, in turn, may account for the lower levels of bonding social capital. Nevertheless, further studies on this specific topic are necessary, in order to gather and critically appraise the evidence in the future.

Social capital and income have heretofore been studied by some researchers. For instance, Kawachi et al. carried out an ecologic study investigating relationships between social capital, income inequality, and mortality in the United States of America, and found that income inequality was strongly correlated with lack of social trust, which, in turn, was associated with total mortality and death rates from cardiovascular diseases, malignant neoplasm, as well as infant mortality (Kawachi et al.). The study is highly informative and useful for researchers and scholars on social capital and public health. It is hoped that, in the future, the relationships between social capital, income, and income inequality will be examined in various other socio-cultural contexts as well.

The results of both regression analyses and Spearman’s Correlation Coefficient indicate that bonding social capital and marriage for males are closely intertwined. The

variable “Ratio of never-married population (male; 30-34 years of age)” yielded the most prominent and noticeable results in both tests: $R^2 = 0.31$; and $r_s = - 0.607$ ($p < 0.001$). Adding to the curiosity is the variable’s gender and age specificity. Bonding social capital and never-married status are negatively correlated in the male subpopulation in the age bracket of 30-34. But what is it about this subpopulation that differs from other subpopulations in Japan?

In 2010, Dentsu, a private company headquartered in Tokyo, Japan, implemented an interesting gender-specific marketing survey stratified in six age categories in the country. Their main purpose was to find out what people of each gender/age category prioritized most in their lives. Interestingly, they found that men in their 30s had the highest representation in the answer choice “To fulfill my own world” (24.1%) as the top priority, whereas women in their 30s were more likely to prioritize “To establish a stable daily life,” chosen by 30.5% of the sub-population group (Dentsu; variable translations mine).

It is surmised that if these men in the 30s were married, their views would perhaps be affected by what may be called spousal diffusion effect. That is, if married, one’s views would be complemented by the spouse’s to some extent through diffusion, and, in this case, the man, due to spousal influences, might give a higher priority “To establish a stable daily life” which would include maintaining and expanding social networks in the community. In contrast, if he stayed single, he would hold onto his views, which might diminish the level of social cohesion than was he married. Dentsu’s survey results seem to help one construct a sensible and psychological as well as social explanation with regard to the negative correlation between bonding social capital and never-married men in the age bracket of 30-34.

Moreover, it is important to point out that marriage per se generally tends to foster and expand social networks by bringing two families together, along with the relatives of each family—more so in some cultures than others. In particular, this aspect of marriage as a social institution bringing about the union of two families and the relatives was highly respected and valued in traditional Japanese marriage, the influences of which are still seen today in varying degrees. Nevertheless, more empirical studies on this particular topic are necessary to clarify the underlying mechanism linking bonding social capital and never-married men in the age bracket of 30-34.

According to a study by Stack on cross-national comparison of marriage, family, and loneliness, it was found that marriage is associated with substantially less loneliness, even when marriage’s concomitant factors of health and financial satisfaction were controlled (Stack). This finding may not come as a surprise; yet it is a critical study to

consider at this juncture, since they offer not only statistical support for our expectations but also information on cross-cultural similarities of marriage involving 17 nations, including Australia, Canada, Japan, and 14 countries in Europe such as Britain, Germany, and Northern Ireland. It may be that less loneliness in Stack's study may possibly be associated with a higher level of social capital that comes with marriage. Yet, this hypothetical association between social capital and the extent of loneliness depending upon marital status also needs to be verified or rejected in future studies.

In summary, the results of this study elucidated the associations between bonding social capital and the "Ratio of never-married population" composed of males in the age bracket of 30 to 34 as well as that of 45 to 49, both of which warrant further study. In addition, bonding social capital's associations with "Average monthly salary of females," "Ratio of felonies to criminal cases," and "Ratio of the newly employed to high school graduates" are also noteworthy and deserve further scrutiny; for instance, the impact of bonding social capital on "Ratio of felonies to criminal cases," if verified repeatedly, could possibly be used as a foundation for socially beneficial public policy for community safety; and, likewise, so could "Average monthly salary of females" as social advancement and participation of women is a topic repeatedly discussed these days in Japan. Another set of salient outcomes in R^2 as well as r_s values are shown by the "Ratio of psychiatric patients per full-time physician." This was the only variable, out of 429, with which bridging social capital was found to be relatively fit and associated. From this outcome, it has become evident that there is a need for more studies—both empirical and theoretical—on social capital and mental health or mental disorders, as firm and robust evidence for and/or against the relationship is critical.

This study has both an advantage and a limitation. One advantage of this study is its interdisciplinary approach, which enabled the inclusion of a large number of variables from various categories, all of which were allowed to "speak" for themselves across categorical divisions. In contrast, the ecologic study design and the group-based data used in this study did not allow for any individual-based analyses which would have lent a heuristic element to the study. Nevertheless, it is hoped that the results of this study will provide ideas and hypotheses for future studies.

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