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SOCIAL CAPITAL AND VIEWS ON SUICIDE VIA THE INTERNET: A
STUDY USING SURVEY DATA

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The author confirms that there are no conflicts of interest to declare.

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Summary

Based on data from surveys conducted in Japan, this paper attempts to examine the effect of social capital on individuals' views about suicide as conveyed via the Internet. Furthermore, this paper compared the effects of social capital accumulated in respondents' residential areas at 15 years of age and in current residential areas. Empirical results show that 15-year-old individuals residing in areas with high social capital are unlikely to understand why people would search the Internet for a companion with whom to commit suicide. However, such a relation is not observed between social capital in the current residential area and views on suicide. This indicates that interpersonal relationships in childhood reduce the externality of suicidal thoughts conveyed via the Internet.

1. INTRODUCTION

Suicide is thought to be closely related to an individual's mental health status and can therefore be regarded as a critical issue in the field of health economics (e.g., Lang, 2013; Kuroki, 2014; Breuer, 2015). The seminal work of Durkheim (1951) suggests that suicide is considered a consequence of the degree to which one is integrated into society. Today, in the modern academic world, the degree of integration into society is captured by the notion of social capital (Putnam, 2000).

In contrast to the era of Durkheim (1951), modern society heavily depends upon interpersonal networks via the Internet. Thus, motivation to commit suicide is possibly provided and shared among acquaintances online. In such situations, when considering health policies, it is important to take into account the influence the Internet has on perceptions and norms associated with committing suicide. The sense of value shared in a society is thought to affect an individual's behavior (e.g., committing suicide). Naturally, a question arises: "What role does social capital play on forming views about suicide as an outcome of Internet communication?"¹ Some research suggests that areas with higher levels of social capital have significantly lower rates of suicide (e.g., Yamamura, 2010; Smith and

¹ Antoci et al. (2012) suggests that communications via the Internet possibly strengthen interpersonal social networks, which in turn accumulate social capital to bridge different social groups.

Kawachi, 2014).² However, these studies used aggregated data at the local government level (e.g., states, prefectures, and provinces). That is, individuals' views about suicide have not been scrutinized, mainly because data cannot be collected from those who have committed suicide. Hence, it is of value to investigate how an individual's views about suicide are formed. Japanese General Social surveys (JGSS) provide individual-level data, including information on variables related to views about suicide. Using such data, this paper attempts to investigate how social capital is related to views about committing suicide and understanding the need to conduct an online search for a companion with whom to commit suicide.

2. METHODS

2.1 Data

Individual-level data from the 2008 JGSS are used in this paper because the 2008 survey included a question about views on suicide.³ Furthermore, the JGSS questionnaire includes standard questions concerning respondents' characteristics obtained via face-to-face interviews. The data cover information related to marital and demographic (age and sex) status, annual

² Health studies have provided evidence that social capital has a significant influence on human behavior and outcomes (e.g., Costa-Font and Mladovsky, 2008; Islam *et al.*, 2008; Scheffler and Brown, 2008). A positive relationship between health status and social capital has been observed (e.g., Kawachi *et al.*, 1997; 1999; Islam *et al.*, 2006; Petrou and Kupek, 2008; D'Hombres *et al.*, 2010; Ronconi *et al.*, 2012). In addition to empirical research, a theoretical economic model is constructed to connect social capital with health (Folland, 2006).

³ Data for this secondary analysis, "Japanese General Social Surveys (JGSS), Ichiro Tanioka," were provided by the Social Science Japan Data Archive, Information Center for Social Science Research on Japan, Institute of Social Science, the University of Tokyo.

household income, years of schooling, age, prefecture of current residence, and prefecture of residence at 15 years of age. A Japanese prefecture is the equivalent to a state in the United States or a province in Canada. There are 47 prefectures in Japan. Table 1 lists the definitions and basic statistics for variables used for estimation in the current paper. The estimated function of the baseline model takes the following form:

$$\begin{aligned}
 VIEW_SUIC \text{ (or } VIEW_SUICINT)_{im} = & \alpha_0 + \alpha_1 SC \text{ (or } SC15)_m + \alpha_2 TRUST_i + \\
 & \alpha_3 NETUSE_{im} + \alpha_4 NETSHOP_{im} + \alpha_5 NETBANK_{im} + \alpha_6 NETHP_{im} + \\
 & \alpha_7 MIGR_{im} + \alpha_8 GINI_m + \alpha_9 SCHOOL_{im} + \alpha_{10} INCOM_{im} + \alpha_{11} AGE_{im} + \\
 & \alpha_{12} AGESQ_{im} + \alpha_{13} MALE_m + \alpha_{14} NOWORK_{im} + \alpha_{15} MARRY_{im} + u_{im},
 \end{aligned}$$

where $VIEW_SUIC$ (or $VIEW_SUICINT$)_{im} represents the dependent variable for individual i and prefecture m . Regression parameters are represented by α . Table 1 shows that the values for $VIEW_SUIC$ (or $VIEW_SUICINT$)_{im} range from 1 to 4. Therefore, an ordered probit model is used to conduct the estimations. The larger the value of $VIEW_SUIC$, the more likely that people will agree with an individual's decision to commit suicide. In the main specification to assess the relationship between social capital and views on suicide via the Internet, larger values for $VIEW_SUICINT$ denote that people are more likely to understand an individual's need to conduct an online search for a companion with whom to commit suicide. The error term is represented by u_{im} . It is reasonable to

assume that the observations may be spatially correlated within a prefecture, as the preference of one agent may well be associated with the preference of another in the same prefecture. To consider such a spatial correlation in line with this assumption, the Stata cluster command was used and z-statistics were calculated using robust standard errors. The advantage of this approach is that the magnitude of spatial correlation can be unique to each prefecture.

Furthermore, a proxy for social capital is measured as follows: in 1996, the Japan Broadcasting Corporation conducted a survey on the thoughts and behaviors of prefecture residents (Japan Broadcasting Corporation, 1997). One of the survey questions asked, “Do you associate on friendly terms with neighbors?” Respondents could choose one of three responses: “Yes,” “Unsure,” or “No.” In the present study, the rates for those who answered “yes” within a prefecture were calculated. This rate can be used as a proxy for social capital. It is assumed here that the proxy for social capital is stable over time. From the survey, a proxy for each of the 47 prefectures was obtained. Because respondents’ current residential prefecture was also obtained, the proxy for social capital can be matched with the individual-level data to create social capital for each respondent (*SC*). Furthermore, information on the respondents’ residential prefecture at 15 years of age was obtained. Hence, social capital for a 15 year old (*SC15*) can be calculated by matching prefecture-level social capital with a respondent’s residential prefecture at age 15. Using *SC* and *SC15* enables the examination of the differing effects of

social capital on the formation of individuals' views. In addition, the Gini (*GIND*) coefficient for the current residential area is matched with the individual's data and is incorporated to control for income inequality. In the estimation where *VIEW_SUICINT* is the dependent variable, various Internet uses are considered to be the key determinants. Therefore, the degree of Internet use should be considered. To this end, *NETUSE*, *NETSHOP*, *NETBANK* and *NETHP* are incorporated.

In addition to *SC* and *SC15*, individual-level generalized trust (*TRUST*) is also incorporated to capture another facet of social capital. Apart from key variables, several control variables are included to capture individual characteristics: age, household income, years of schooling, work status, marital status and gender.

3. RESULTS

Table II presents the results of the estimations when *VIEW_SUICI* is the dependent variable, while Table III presents the results of estimations for *VIEW_SUICINT*. The focus of this paper is on the results of the key variables. Table II shows that *SC* and *SC15* are negative in all columns. *SC15* is statistically significant in columns (2) and (4), and *SC* is statistically significant in columns (1) but not in column (3). Therefore, *SC15* is more robust than *SC*.

In Table III, *SC* and *SC15* are negative in all columns. *SC15* is statistically significant in all columns, and in contrast, *SC* is not statistically

significant in any columns. If individuals resided in areas with high social capital at age 15, they are unlikely to agree with those who decide to commit suicide and are unlikely to understand the need to conduct an online search for a companion with whom to commit suicide. However, the effects of social capital in the current residential area are not so clearly observed. Concerning variables capturing the various uses of the Internet, they are positive, with the exception of *NETUSE*. However, *NETBANK* is only statistically significant in columns (3) and (4). Thus, the effect of the particular use of the Internet is not clearly observed.

TRUST is negative and is statistically significant in all columns in Tables II and III. Hence, individual-level trust leads people to have negative views about suicide. Apart from the key variables shown as above, most of the control variables are not statistically significant.

4. CONCLUSION AND DISCUSSION

In contrast to the twentieth century, there now appears to be a wider range of reasons behind people's decisions to commit suicide, aided in part by the spread of communication via the Internet. People are now able to search online for companions with which to commit suicide. Interactions via the Internet can possibly trigger suicide, even if one does not personally have a motivation to commit suicide. In the future, suicide may become prevalent among strangers via online communications. That is, online communication may be a negative externality that increases suicide rates.

The current situation is very different from that in the twentieth century; thus, is the argument of Durkheim (1951) still relevant to explain an individual's suicidal behavior? This paper tackled this question using individual-level data matched with social capital in respondents' current residential area and residential area at 15 years of age. The empirical results reveal that higher levels of social capital at 15 years of age mean that individuals are less likely to hold positive views about committing suicide. However, such a relation is not robustly observed between social capital levels in respondents' current residential area and views on suicide. This can be interpreted as suggesting that people are unlikely to justify suicide as a means of escaping from difficulties if they have grown up with close interpersonal relationships with neighbors. High levels of social capital in childhood communities mean that the Internet does not represent a negative externality. The circumstances during one's childhood play a greater role in forming views about suicide, and thus help to ensure better mental health.

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Table I. Descriptive Statistics

Variables	Definition	Mean	Std. Dev.
Regional characteristics			
<i>SC</i>	Rate of those who actively participate in community events within the prefecture where respondent currently resides	0.47	0.06
<i>SC15</i>	Rate of those who actively participated in community events within the prefecture where the respondent resided at 15 years of age	0.48	0.06
<i>GINI</i>	Gini coefficients for 2004	0.30	0.01
Individual characteristics			
<i>VIEW_SUIC</i>	Views on suicide: Question: If a person is overwhelmed by problems and there is nothing he/she can do, do you agree with his/her decision to commit suicide?	2.53	0.67

	Response options:		
	1 (Disagree), 2 (Somewhat disagree), 3 (Somewhat agree), 4 (Agree)		
<i>VIEW_SUICINT</i>	Views on suicide via the Internet:	2.34	0.52
	Question: Some people search the Internet for a companion with whom to commit suicide. Can you understand their need to do so?		
	Response options:		
	1 (Cannot understand at all), 2 (Cannot understand very well), 3 (Can understand to some extent), 4 (Can understand well)		
<i>TRUST</i>	Question: Generally speaking, would you say that most people can be trusted?	2.09	0.56
	Response options:		
	1 (No), 2 (Depends), 3 (Yes)		
<i>NETUSE</i>	1 if the respondent has searched for information, otherwise 0	0.64	---
<i>NETSHOP</i>	1 if the respondent has engaged in Internet shopping, otherwise 0	0.26	---

<i>NETBANK</i>	1 if the respondent conducts Internet banking, otherwise 0	0.07	---
<i>NETHP</i>	1 if the respondent has made web pages, otherwise 0	0.05	---
<i>MIGR</i>	1 if the respondent's residential prefecture at 15 years of age differs from current residential prefecture, otherwise 0	0.15	---
<i>SCHOOL</i>	Years of schooling	12.1	2.62
<i>INCOM</i>	Household income ^a	611.4	417.0
<i>AGE</i>	Age	52.3	16.6
<i>AGESQ</i>	Square of ages	---	---
<i>MALE</i>	1 if the respondent is male, otherwise 0	0.45	---
<i>NOWORK</i>	1 if the respondent is unemployed, otherwise 0	0.38	1.16
<i>MARRY</i>	1 if the respondent is married, otherwise 0	0.78	---

Notes: ^a 10,000 Yen

Source: Ministry of Health, Labor and Welfare (various years), Jinko Dotai Tokei Tokushu Hokoku.

Asahi Shimbunsha (various years). *Minryoku: Todofuken-betsu Minryoku Sokutei Shiriyoshu.* Tokyo: Asahi-Shimbunsha.

Table II. Regression results for VIEW_SUIC1 (ordered probit model)

	(1)	(2)	(3)	(4)
<i>SC</i>	-2.70*		-2.42	
	(-1.89)		(-1.42)	
<i>SC15</i>		-2.20*		-2.78**
		(-1.86)		(-2.03)
<i>TRUST</i>	-0.31***	-0.32***	-0.32***	-0.35***
	(-3.01)	(-3.11)	(-2.81)	(-3.04)
<i>NETUSE</i>			0.11	0.11
			(0.68)	(0.65)
<i>NETSHOP</i>			0.03	0.03
			(0.19)	(0.21)
<i>NETBANK</i>			0.03	0.05
			(0.11)	(0.20)
<i>NETHP</i>			0.28	0.23
			(0.92)	(0.73)
<i>MIGR</i>	0.01	0.12	0.01	0.15
	(0.08)	(0.82)	(0.03)	(0.88)
<i>GINI</i>	-5.70	-4.25	-3.75	-3.29
	(-0.99)	(-0.74)	(-0.54)	(-0.48)
<i>SCHOOL</i>	-0.04	-0.04	-0.04	-0.04

	(-1.39)	(-1.49)	(-1.35)	(-1.50)
<i>INCOM</i>	0.20	0.20	0.18	0.18
	(1.27)	(1.29)	(1.04)	(1.05)
<i>AGE</i>	0.01	0.01	-0.01	-0.01
	(0.45)	(0.50)	(-0.11)	(-0.12)
<i>AGESQ</i>	-0.0002	-0.0002	-0.0001	0.0001
	(-0.75)	(-0.79)	(-0.92)	(0.02)
<i>MALE</i>	0.27**	0.25*	0.31*	0.27*
	(2.05)	(1.89)	(1.91)	(1.71)
<i>NOWORK</i>	0.23	0.22	0.10	0.07
	(1.56)	(1.49)	(0.53)	(0.37)
<i>MARRY</i>	-0.53**	-0.52**	-0.02	-0.002
	(-2.59)	(-2.52)	(-0.09)	(-0.01)
Log	-377	-376	-292	-291
pseudo-likelihood				
Observations	444	444	348	348

Notes: The reported values of INCOM (SCHOOL) are multiplied by 1,000 (10) for convenience of interpretation. Values in parentheses are z-statistics obtained by robust standard error clustered on residential prefecture. *, **, and *** indicate significance at 10%, 5%, and 1% levels, respectively. In all

estimations, dummies for size of residential place are included but results are not reported.

Table III. Regression results for VIEW_SUICINT (ordered probit model)

	(1)	(2)	(3)	(4)
<i>SC</i>	-0.24		-0.02	
	(-0.14)		(-0.01)	
<i>SC15</i>		-3.01**		-2.49*
		(-2.27)		(-1.74)
<i>TRUST</i>	-0.24*	-0.24*	-0.25*	-0.26*
	(-1.90)	(-1.93)	(-1.80)	(-1.84)
<i>NETUSE</i>			-0.30	-0.29
			(-1.44)	(-1.39)
<i>NETSHOP</i>			0.19	0.20
			(0.95)	(1.01)
<i>NETBANK</i>			0.48*	0.47*
			(1.80)	(1.78)

<i>NETHP</i>			0.51	0.48
			(1.61)	(1.48)
<i>MIGR</i>	0.02	0.21	-0.01	0.12
	(0.12)	(1.00)	(-0.09)	(0.55)
<i>GINI</i>	-8.68	-11.4	-7.99	-10.7
	(-1.14)	(-1.48)	(-0.91)	(-1.22)
<i>SCHOOL</i>	-0.01	-0.01	0.01	0.01
	(-0.19)	(-0.16)	(0.30)	(0.33)
<i>INCOM</i>	0.37*	0.37*	0.31	0.32
	(1.90)	(1.92)	(1.40)	(1.42)
<i>AGE</i>	-0.05	-0.05	-0.05	-0.06
	(-1.36)	(-1.40)	(-1.11)	(-1.26)
<i>AGESQ</i>	0.0003	0.0003	0.0003	0.0004
	(0.93)	(1.02)	(0.69)	(0.88)
<i>MALE</i>	0.08	0.05	0.17	0.14
	(0.56)	(0.36)	(1.00)	(0.83)
<i>NOWORK</i>	0.11	0.07	-0.01	-0.05
	(0.62)	(0.39)	(-0.03)	(-0.24)
<i>MARRY</i>	-0.18	-0.15	-0.23	-0.19
	(-0.64)	(-0.53)	(-0.69)	(-0.59)
Log	-245	-243	-189	-187

pseudo-likelihood				
ood				
Observations	370	370	306	306

Notes: The reported values of INCOM (SCHOOL) are multiplied by 1,000 (10) for convenience of interpretation. Values in parentheses are z-statistics obtained by robust standard error clustered on residential prefecture. * and ** indicate significance at 10% and 5% levels, respectively. In all estimations, dummies for size of residential place are included but results are not reported.