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Original Article

Does Caregiver's Social Bonding Enhance the Health of their Children?: The Association between Social Capital and Child Behaviors

Takeo Fujiwara[a]*, Soshi Takao[b], Toshihide Iwase[b], Jun Hamada[c], and Ichiro Kawachi[d]

[a]Department of Social Medicine, National Research Institute for Child Health and Development, Setagaya-ku, Tokyo 157-8535, Departments of [b]Epidemiology, and [c]Health Policy & Health Economics, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama 700-8558, Japan, and [d]Department of Society, Human Development, and Health, Harvard School of Public Health, Boston, MA 02115, USA

Little is known about the association between social capital and child behaviors. This study aims to investigate that association. A complete population-based, cross-sectional survey was conducted for all the caregivers with preschool children in a rural town in Okayama prefecture in Japan. Two dimensions of individual-level social capital and unhealthy child behaviors were reported by parent-administered questionnaire. We analyzed 354 preschool children (57.6% of all children for whom questionnaires were completed). Children whose main caregiver had high cognitive social capital were 89% less likely to miss breakfast (odds ratio [OR] = 0.11; 95% confidence interval [CI]: 0.01-1.03). Children whose caregiver had high structural social capital were 71% less likely to wake up late (OR = 0.29; 95% CI: 0.12-0.71) and 78% less likely to skip tooth brushing more than once per day (OR = 0.22; 95% CI: 0.05-0.93). Both cognitive and structural social capital were negatively associated with unhealthy child behaviors. A further intervention study is needed to confirm the impact of social capital on child behavior.

Key words: tooth brushing, child health, social capital, skipping breakfast, watching TV

Social capital has been broadly defined as the resources that individuals access through their networks [1]. Individuals who lack network ties (*i.e.*, people who are socially isolated) have been shown to be at increased risk of developing illness [1]. More recently, interest has also turned toward examining the possible contextual influence of community-based social networks on child health outcomes. Researchers have begun to ask whether residents of communities with low levels of social integration might also be at increased risk of poor child health outcomes, such as obesity [2-5], dental caries [6], or behavioral problems [7]. However, few studies have investigated the link between social capital and child behaviors—a link which may explain the mechanism of association between social capital and child health. Unhealthy lifestyle choices—such as not eating breakfast, late rising time, late bedtime, and long periods of watching TV and playing video games—have been associated with child obesity [8-11] and behavioral problems [12-14], and insufficient tooth brushing has been found to cause dental caries [15].

In practice, researchers have adopted a variety of indicators to assess social capital [16], including

Received November 14, 2011; accepted March 9, 2012.
*Corresponding author. Phone:+81-3-3417-2663; Fax:+81-3-3417-2663
E-mail:tfujiwara@nch.go.jp (T. Fujiwara)

trust in others [17], sense of belonging to a community [18, 19], mutual assistance among neighbors [20], volunteering activity [21], group membership [22], and even voting participation [23]. These indicators have been categorized as either tapping the "cognitive" dimensions of social capital (such as perceptions of trust, as well as beliefs regarding the extent to which neighbors can be called upon to provide social support), or the "structural" dimensions of social capital, which center on reports of actual behaviors, such as participating in local associations [24].

The aim of this study was to investigate the link between individual-level social capital (cognitive and structural) and unhealthy child behaviors (not eating breakfast every day, late rising time, late bedtime, long periods of watching TV or playing video games, and not brushing the teeth), after controlling for potential confounders.

Materials and Methods

Sample. Details of the sample are described in a previous report [25]. In February 2008, M town conducted a population-based cross-sectional survey to investigate the descriptive features related to maternal and child health. M town is a rural area located west of Okayama prefecture, and has a population of about 15,000. In the present survey, using the population registry of this town as of February 14, 2008, all 616 preschool children aged 2 to 6 years and their parents were chosen as a target population. A self-administered questionnaire was sent to the caregivers by the municipality office staff of M town. Caregivers filled in their children's basic characteristics and lifestyle factors, as well as their own basic characteristics, and returned the questionnaire by postal mail. In order to increase the response rate, municipal office staff reminded the caregivers to return the completed questionnaire. The return of the questionnaire was taken as a provision of informed consent. To avoid potential correlation between siblings, we restricted the sample to the eldest child in each household surveyed.

Unhealthy child behaviors. Unhealthy child behaviors were measured by a questionnaire administered by the caregivers. We collapsed the original answers into dichotomous outcomes as follows: not eating breakfast every day (0 = eat breakfast every day; 1 = eat breakfast 6 or fewer days/week), late rising (0 = before 07 : 00; 1 = after 07 : 00), late bedtime (0 = before 22 : 00; 1 = after 22 : 00), long periods of watching TV and playing video games (0 = less than 2 h; 1 = more than 2 h), and not brushing the teeth more than once per day (0 = 2 or more times/day; 1 = 1 or fewer time/day).

Social capital measurement. Individual-level social capital was assessed in terms of cognitive and structural dimensions. The cognitive dimension of social capital was assessed by the main caregiver as neighborhood connectedness; it was comprised of 12 items (see Appendix 1) in correspondence with the standard measure used in Japanese neighborhood research. Each item was gauged via a five-point Likert scale: (1 = agree, 2 = somewhat agree, 3 = neither agree nor disagree, 4 = somewhat disagree, and 5 = disagree). Factor analysis of the items showed one factor with an Eigen value of more than 2; thus, the arithmetic summation of these items was thought to illustrate neighborhood connectedness, and the sum of the items was defined as the score on a neighborhood connectedness scale (Cronbach's alpha = 0.84).

Structural social capital was scored as the total number of 13 major social associations to which the main caregiver belonged (see Appendix 2).

Other variables. We selected the following variables as potential confounders: age (continuous) and gender (male or female) of the child, age (continuous), education (high school or less, professional school or junior college, college or graduate college) and working status of the mother (full-time, part-time, housewife, other), working hours of the father (< 8 h, 8–12 h, 12+ h, unemployment/missing), type of main caregiver (mother, grandmother, other), family composition (parent-child, parent-child and grandparent, parent-child, grandparent and other, and other), and the number of siblings in the family (see details in Table 1).

Analysis. First, the neighborhood connectedness scale was collapsed into 3 categories, based on the mean and standard deviation (SD): "Low" indicated below mean minus one SD, "High" indicated above mean plus one SD, and "Middle" was between "Low" and "High." The distribution of neighborhood connectedness scale categories was as follows: Low: 56 (15.9%); Middle: 236 (66.9%); and High: 61

Table 1 Demographic characteristics and behaviors of samples (N = 354)

			N (%)	Mean (SD)
Demographic characteristics				
Child	Age	(n = 353)		4.9 (1.3)
	Gender	male	183 (51.7)	
		female	171 (48.3)	
Mother	Age	(n = 344)		33.3 (5.1)
	Education	high school or less	150 (42.3)	
		professional school or junior college	153 (43.2)	
		college or graduate college	43 (12.2)	
		missing	8 (2.3)	
	Working status	full-time	105 (29.7)	
		part-time	105 (29.7)	
		housewife	99 (28.0)	
		other	36 (10.2)	
		missing	9 (2.5)	
Father	Working hours	< 8 h	47 (13.3)	
		8–12 h	241 (68.1)	
		12 + h	26 (7.3)	
		unemployment/missing	40 (11.3)	
Family	Main caregiver	mother	319 (90.1)	
		grand mother	17 (4.8)	
		other	6 (1.7)	
		missing	12 (3.4)	
	Family composition	parent-child	178 (50.3)	
		parent-child and grandparent	122 (34.5)	
		parent-child, grandparent and other	50 (14.1)	
		other/missing	4 (1.1)	
	Number of siblings	0	75 (21.2)	
		1	167 (47.2)	
		2	89 (25.1)	
		3	22 (6.2)	
		missing	1 (0.3)	
Unhealthy child behaviors				
	Not eating breakfast every day	(n = 354)	31 (8.8)	
	Late rising time	(n = 353)	127 (36.0)	
	Late bedtime	(n = 354)	58 (16.4)	
	Long watching TV or playing video game	(n = 353)	93 (26.4)	
	Not brushing the teeth more than once per day	(n = 352)	56 (15.9)	

SD: standard deviation

(17.3%). One respondent who did not provide a neighborhood connectedness score (n = 1) was excluded from the analysis (*i.e.*, N = 353). The number of association memberships was also collapsed into 4 categories, based on distribution: 0 associations: 83 (23.5%); 1 association: 82 (23.2%); 2–3 associations: 124 (35.0%); 4 or more associations: 65 (18.4%).

Second, a multiple logistic regression was applied to determine the associations between individual-level social capital (cognitive and structural) and unhealthy child behaviors adjusted for age and gender of the child, age and education of the mother, working hours of the father, type of main caregiver, type of family composition, and number of siblings in the family. For cases with missing data on continuous variables (*i.e.*, maternal age (n = 10) and child age (n = 1)), the mean was imputed for multiple logistic regression. For

cases with missing data on categorical variables, the missing variables were treated as dummy variable. STATA version 10 was used for statistical analysis, and values of $p < 0.05$ were considered statistically significant (two-tailed).

Results

Questionnaires were returned by 476 out of the 616 caregivers of preschool children (77.3%). We excluded those questionnaires that had no identification number (n = 2) and those children who were younger siblings (n = 119). Further, the case with no response on all child behaviors was excluded (n = 1). Thus, we included 354 (57.5%) preschool children in the final analyses.

Table 1 presents the demographic characteristics of the study sample (children, mothers, fathers and families) and the prevalence of unhealthy child behaviors. The average age of the children was 4.9 years (standard deviation, SD: 1.3), while that of the mothers was 33.3 years (SD: 5.1; range, 21–49). Approximately 70% of mothers were working, with an equal distribution of full-time and part-time workers. Over 75% of fathers worked more than 8 h a day. Most of the main caregivers were mothers and half of the families were living with grandparent(s). The genders of the children were distributed equally. The majority of children were living with siblings (78.5%). Children with unhealthy behaviors were, overall, in the minority: not eating breakfast, 8.8%; late rising time, 36.0%; late bedtime, 16.4%; long periods of watching TV or playing games, 26.4%; and not brushing the teeth more than once per day, 15.9%.

Table 2 shows the adjusted odds ratios (ORs) and 95% confidence intervals (CIs) of unhealthy child behaviors, by neighborhood connectedness categories. The behavior of "not eating breakfast every day" was less prevalent in families with high cognitive social capital than in families with low cognitive social capital at a marginally significant level (OR: 0.11; 95% CI: 0.01–1.03), even after adjusting for the related confounding variables. The trend of this tendency was significant ($p = 0.047$). In regard to the other unhealthy behaviors, there were no significant effects by cognitive social capital; however, most point estimates fell below 1.0, suggesting that cognitive social capital had a preventive effect on the unhealthy behaviors of children.

Table 3 shows the odds ratios (OR) of unhealthy child behaviors by number of associations (structural social capital). Structural social capital had consistent preventive effects on unhealthy child behaviors. The OR values for "late rising time" and "not brushing the teeth more than once per day" were 0.29 and 0.22 times lower, respectively, for children whose main caregiver belonged to 4 or more associations (high structural social capital) than for those whose main caregiver belonged to no associations (low structural social capital). Further, these trends were significant ($p = 0.044$ and 0.042, respectively). The association between structural social capital and watching TV or playing video games was U-shaped, suggesting that 2 or 3 may be the optimal number of associations to which the main caregiver should belong in order to assist in restricting a child's TV watching or video game playing to less than 2 h (OR = 0.48; 95% CI: 0.23–1.03).

Discussion

Data from a cross-sectional survey in a rural area of Japan suggest that low individual social capital of main caregivers is associated with unhealthy behaviors among their children. Overall, the OR values for unhealthy behaviors were lower for children whose main caregiver had high cognitive and structural social capital than for those whose main caregiver had low social capital, even after adjusting for the age and gender of the child, age and education of the mother, working hours of the father, type of caregiver, type of family composition, and number of siblings in the family. In addition, a significant association was observed between structural social capital and both rising time and tooth brushing, suggesting that structural social capital has specific effects on unhealthy child behaviors.

To the best of our knowledge, this is the first study to examine quantitatively the relationship between social capital and lifestyles among preschool children. A previous study reported that low cognitive social capital, as reported by parents, increased the risk of physical inactivity among children and adolescents (*i.e.*, ages 6–17 years) in the US [26]. This finding suggests that the parental perception of the neighborhood connectedness influences child behavior, which was

Table 2 The distribution and odds ratios of unhealthy child behaviors by neighborhood connectedness (cognitive social capital), among preschool children in Okayama, Japan

		Not eating breakfast every day (n, %) (N = 353)	Adjusted OR*	Late rising time (n, %) (N = 352)	Adjusted OR*	Late bed-time (n, %) (N = 353)	Adjusted OR*	Long watching TV or playing video game (n, %) (N = 352)	Adjusted OR*	Not brushing teeth more than once per day (n, %) (N = 351)	Adjusted OR*
Neighborhood connectedness	Low	7 (12.5)	Reference	20 (35.7)	Reference	10 (17.9)	Reference	17 (30.4)	Reference	10 (17.9)	Reference
	Middle	23 (9.8)	0.75 (0.27–2.08)	87 (37.0)	1.09 (0.55–2.15)	44 (18.6)	1.06 (0.46–2.41)	62 (26.4)	0.92 (0.45–1.87)	37 (15.8)	0.77 (0.32–1.85)
	High	1 (1.6)	0.11 (0.01–1.03)	20 (32.8)	0.95 (0.41–2.19)	4 (6.6)	0.33 (0.09–1.17)	13 (21.3)	0.59 (0.24–1.47)	8 (13.1)	0.69 (0.22–2.11)
	P for trend		**0.047**		0.891		0.111		0.258		0.509

*Adjusted for age and gender of child, age and education of mother, working hours of father, type of main caregiver, type of family composition, and number of siblings in family. Bold signifies $p < 0.05$.

Table 3 The distribution and odds ratios of unhealthy child behaviors by number of associations (structural social capital), among preschool children in Okayama, Japan

		Not eating breakfast every day (n, %) (N = 354)	Adjusted OR*	Late rising time (n, %) (N = 353)	Adjusted OR*	Late bedtime (n, %) (N = 354)	Adjusted OR*	Long watching TV or playing video game (n, %) (N = 353)	Adjusted OR*	Not brushing teeth more than once per day (n, %) (N = 352)	Adjusted OR*
Number of associations caregiver belongs to	0	12 (14.5)	Reference	39 (47.0)	Reference	19 (22.9)	Reference	26 (31.7)	Reference	18 (22.0)	Reference
	1	6 (7.3)	0.39 (0.12–1.23)	28 (34.2)	0.52 (0.26–1.05)	12 (14.6)	0.55 (0.23–1.30)	26 (31.7)	0.89 (0.43–1.83)	14 (17.3)	0.68 (0.28–1.67)
	2–3	8 (6.5)	0.43 (0.14–1.35)	49 (39.8)	0.81 (0.42–1.59)	19 (15.3)	0.65 (0.28–1.50)	23 (18.6)	0.48 (0.23–1.03)	21 (16.9)	0.58 (0.24–1.41)
	4+	5 (7.7)	0.63 (0.16–2.47)	11 (16.9)	**0.29 (0.12–0.71)**	8 (12.3)	0.70 (0.24–2.05)	18 (27.7)	0.91 (0.39–2.12)	3 (4.6)	**0.22 (0.05–0.93)**
	P for trend		0.359		**0.044**		0.454		0.360		**0.042**

*Adjusted for age and gender of child, age and education of mother, working hours of father, type of main caregiver, type of family composition, and number of siblings in family. Bold signifies $p < 0.05$.

also observed in our study in terms of skipping breakfast.

However, the mechanism of the link between cognitive social capital and skipping breakfast might be different from the link between social capital and physical inactivity. The association between cognitive social capital and physical inactivity can be interpreted as follows: parents with low cognitive social capital might prohibit children from physical activity, if they tend to consider their neighborhood as unsafe or tend not to trust the neighbors. In the case of cognitive social capital and skipping breakfast, cognitive social capital might function as a social pressure. Caregivers with high cognitive social capital tend to feel that they should provide breakfast every day, as a parental responsibility, and they might feel that if they failed to provide breakfast, their neighbors could perceive them as neglecting their child. In addition to these contextual effects, low cognitive social capital might be associated with lack of information on child health (*e.g.*, the importance of eating breakfast) or insufficient social support from the neighborhood, which might be associated with a failure to prepare breakfast for children due to the caregiver's psychological stress. In conjunction with this, other unmeasured potential confounders, such as the caregiver's personality, household income, or attendance of nursery school may be associated with both social capital and unhealthy child behaviors. Further studies are warranted to elucidate these possible mechanisms on the association between social capital and child health adjusted for suggested potential confounders.

Our study adds to the literature by suggesting that not only cognitive social capital (*i.e.*, perceived social capital by parents) but also structural social capital (*i.e.*, the number of associations to which parents belong) are associated with unhealthy child behaviors. Specifically, structural social capital showed strong associations with rising time and tooth brushing. Structural social capital might have a direct link with unhealthy child behavior: main caregivers who belong to several associations are more likely to go out, sometimes early in the morning, and so the children of such caregivers would need to rise early. Another possible pathway is health information: main caregivers who belong to some associations are more likely to receive health information, such as the importance of frequent tooth brushing and early bedtime for their child's health.

There was an interesting finding in the present analysis: the association between structural social capital and watching TV or playing video games was U-shaped, suggesting that it may be optimal for main caregivers to belong to 2 or 3 associations, if the goal is to restrict a child's TV or video game time to no more than 2 h a day. That is, low structural social capital of the caregiver (*i.e.*, belonging to no or only one association) can lead to longer periods of watching TV or playing video games on the part of the children, because preschool children are more likely to be at home if their caregivers have fewer social activities, and being at home would tend to promote TV watching and video game playing. In addition, such main caregivers might have fewer opportunities to receive information on the hazards of watching TV or playing video games for long periods. Alternatively, if the main caregivers belong to 4 or more associations, a child might be more likely to be left at home without parental supervision, which would similarly induce longer periods of watching TV or playing video games. A further cohort study is thus warranted to explore the mechanism by which structural social capital affects the watching of TV or the playing of video games.

This study has several limitations other than potential confounders, each of which should be addressed. First, as this is a cross-sectional study, reverse causation might partially explain the association between social capital and unhealthy child behaviors. For example, if a child is late in rising, the main caregiver may be unable to join in community activities. Meanwhile, no connection is likely between the main caregivers' memberships in associations and whether or not their children brush their teeth regularly. Second, the assessment of unhealthy child behaviors was based on caregiver's reports, which may not accurately reflect the true prevalence; however, other studies have also used parent reports on child behaviors [26]. Furthermore, any inaccuracies inherent in the caregiver's report should distort the results toward the null, and thus such inaccuracies cannot fully explain significant associations. Third, because our exposures and outcomes are both subjective measures, they might suffer from the so-called common methods bias. However, the differential results among child behaviors cannot be fully explained in terms of

this bias.

Nonetheless, the findings of the current study suggest a possible positive link between social capital and unhealthy child behaviors. Specifically, structural social capital of the caregivers showed a positive association with early rising and regular tooth brushing in children. Therefore, it is expected that an intervention to enhance or maintain social capital might be effective to improve unhealthy child behaviors. Because social capital affects on child behaviors, it would be worth investigating whether health policies focused on social capital enhancement could actually improve child health.

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Appendix 1. Cognitive social capital questionnaire

1. I feel that I belong to the neighborhood.
2. I think that it is important to get along with neighbors.
3. I have someone in the neighborhood whom I can consult.
4. I sometimes borrow from/lend to neighbors certain commodities.
5. I sometimes perform neighborhood activities to maintain a good neighborhood.
6. I think that it is preferable to have similar attitudes with neighbors.
7. I often talk to neighbors.
8. I think that my neighborhood is very safe.
9. I think that my neighbors would help someone who was having difficulties.
10. I think that my neighbors would look after my house if I were to go way.
11. I think that my neighbors often greet each other.
12. I would like to continue to live in my neighborhood.

Appendix 2. Structural social capital assessment items

1. Residence/neighborhood association
2. Parent–teacher association
3. Ladies'/elderly/juvenile society
4. Fire company, anti-crime association
5. Farmer's/fisherman's co-operative association, forestry society
6. Chamber of commerce, other economic groups
7. Labor union
8. Circle of sports/recreation/hobby/culture activities
9. Alumni association
10. Religious association
11. Co-op association
12. Political group, supporter's association
13. Civic association, environment/nature conservation groups

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