Social Capital and Self-Rated Health: A Contextual Analysis

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ABSTRACT

Objectives. Social capital consists of features of social organization—such as trust between citizens, norms of reciprocity, and group membership—that facilitate collective action. This article reports a contextual analysis of social capital and individual self-rated health, with adjustment for individual household income, health behaviors, and other covariates.

Methods. Self-rated health ("Is your overall health excellent, very good, good, fair, or poor?") was assessed among 167259 individuals residing in 39 US states, sampled by the Behavioral Risk Factor Surveillance System. Social capital indicators, aggregated to the state level, were obtained from the General Social Surveys.

Results. Individual-level factors (e.g., low income, low education, smoking) were strongly associated with self-rated poor health. However, even after adjustment for these proximal variables, a contextual effect of low social capital on risk of self-rated poor health was found. For example, the odds ratio for fair or poor health associated with living in areas with the lowest levels of social trust was 1.41 (95% confidence interval = 1.33, 1.50) compared with living in high-trust states.

Conclusions. These results extend previous findings on the health advantages stemming from social capital. (*Am J Public Health.* 1999;89:1187–1193)

Social scientists have long puzzled over why some communities prosper and have effective political institutions and law-abiding and healthy citizens while other communities do not. Researchers have begun to turn to the concept of social capital as a possible explanation. *Social capital* has been defined as those features of social organization—such as the extent of interpersonal trust between citizens, norms of reciprocity, and density of civic associations—that facilitate cooperation for mutual benefit.[1–3] Social capital has been claimed to be important for the enhancement of government performance and the functioning of democracy,[2] for the prevention of crime and delinquency,[4–6] and, more recently, for the maintenance of population health.[7]

Kawachi et al.[7] used US data aggregated at the state level and reported strong cross-sectional correlations between indicators of social capital and mortality rates. In that study, social capital (or the lack thereof) was measured by responses to the General Social Surveys[8] about the degree of mistrust, levels of perceived reciprocity, and per capita membership in voluntary associations of all kinds.[7] Each indicator of social capital was strikingly correlated with lower mortality rates ($r = 0.79$, 0.71, and –0.49, respectively), even after adjustment for state median income and poverty rates.[7]

Research dating back to Durkheim's study of the causes of suicide[9] has shown that social integration can enhance population well-being. Epidemiologic investigations of social ties have found that individuals who lack social connections have 2 to 3 times the risk of dying from all causes compared with well-connected individuals.[10,11] But an important distinction must be drawn between social integration measured as an individual characteristic (which is how most epidemiologic studies have measured social networks) and social integration measured as a collective characteristic (which is how social capital is conceptualized). The mechanisms linking social integration to health may differ depending on the level at which integration is measured. For example, social capital measured at the community level may determine patterns of political participation and policy-setting that are more egalitarian and health-promoting,[3] whereas social networks measured at the individual level may fail to capture these emergent group-level processes. In other words, collective features of society may not be reducible to the attributes of individuals living in it.[12]

Analyses of ecological concepts such as social capital are often susceptible to the ecological fallacy (i.e., correlations at the group level may not apply to individual risks).[13–15] We therefore undertook the present study to determine whether a contextual effect of social capital could be demonstrated for individual health. To address the problem in contextual analyses of misspecifying individual-level relations (and hence, arbitrarily interpreting residual differences as "contextual effects"[16,17]), we controlled for a range of individual-level factors that predict health, including household income, race, health insurance coverage, and lifestyle behaviors.

Methods

The Behavioral Risk Factor Surveillance System

We used data from the Behavioral Risk Factor Surveillance System (BRFSS), which

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is a state-representative, random-digit-dial telephone survey of US residents, conducted under the direction of the Behavioral Surveillance Branch of the National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention (CDC).[18] Each state uses probability samples in which all households with telephones have a nonzero chance of inclusion, which is designed to produce comparable state-level estimates for the civilian noninstitutionalized population 18 years or older. In 1993, the BRFSS began asking a question about perceived general health[19]: "Would you say that in general your health is excellent, very good, good, fair, or poor?" From this item, we created a dichotomous outcome measure (1 = fair or poor; 0 = excellent, very good, or good).

A recent review of 27 community studies concluded that even such a simple global assessment appears to have high predictive validity for mortality, independent of other medical, behavioral, or psychosocial risk factors.[20] For most studies, odds ratios (ORs) for subsequent mortality ranged from 1.5 to 3.0 among individuals reporting poor health compared with excellent health.[20] The risk of mortality for self-rated poor health often exceeded that of smoking when these rates were reported in the same study.[20] Furthermore, self-rated health has been shown in longitudinal studies to predict the onset of disability.[21–25] To achieve stable estimates for individuals living in the less populous states, we cumulated data from the 1993 and 1994 surveys.

Sociodemographic data available on the BRFSS include race (White, Black, other), sex, age (<25, 25–39, 40–64, ≥ 65 years), household income (<$10 000, $10 000–$14 999, $15 000–$19 999, $20 000–$24 999, $25 000–$34 999, ≥ $35 000 per year, unknown), and educational attainment (less than high school, high school graduate, some college or trade school, college graduate). In addition, the BRFSS includes data on living arrangement (living alone vs not alone) and health-related variables, including current smoking status (yes/no), obesity (body mass index >27.8 kg/m^2 for males and >27.3 kg/m^2 for females), current health insurance coverage, and whether the individual had a health checkup within the past 2 years.

Social Capital Indicators

Indicators of social capital, aggregated to the state level, were obtained from the General Social Surveys, as previously described.[7] This nationally representative survey samples noninstitutionalized English-speaking persons 18 years or older living in the United States, but only 39 states were included because residents of less populous states (e.g., Delaware) were not sampled. We averaged 5 years of cumulated data (1986 through 1990) from the survey, representing 7654 individual observations from 39 states (mean number of respondents per state = 196, standard deviation [SD] = 146).

The extent of civic trust was assessed by responses to the following General Social Survey item: "Generally speaking, would you say most people can be trusted?" Collective perceptions of reciprocity were tapped by the following item: "Would you say that most of the time people try to be helpful, or are they mostly looking out for themselves?" Finally, respondents in the General Social Survey were asked about membership in a wide variety of voluntary associations, including church groups, sports groups, professional societies, political groups, and fraternal organizations. From these responses, we estimated the per capita membership of voluntary associations in each state.

Because the General Social Survey was designed to be representative at the national and regional, but not the state, level, we used a poststratification procedure to adjust the data for the extent to which survey respondents may not have been representative of the states in which they resided. We adjusted all estimates by means of weights based on the distribution of age, race, and educational attainment of survey respondents, as previously described.[7]

Data Analyses

The BRFSS uses a multistage cluster design,[26] based on selection of clusters of telephone numbers (determined by the first 8 digits of 10-digit numbers), selection of households, and selection of respondents.[26] The primary sampling units are composed of a list of random 8-digit numbers exclusive of nonresidential telephone numbers. Within each primary sampling unit, the remaining 2 digits are assigned in random order, and interviewers call until 3 residences are recruited. After a residence has been recruited, a respondent is randomly chosen from among household members 18 years or older. Weights are based on the probability of selection and adjusted for nonresponse and disproportionate sampling of subgroups relative to the state's population distribution.[18] The sampling procedure requires special statistical software to account for clustering. Data were analyzed with the SUDAAN logistic regression procedure,[27] which accounts for the sampling weights used in the BRFSS and the probability that outcomes for individuals within states may be correlated.

States were grouped a priori into 3 levels of social capital (high, medium, or low), based on cutpoints defined by 1.0 standard deviation on either side of the overall mean. For example, the mean level of mistrust (percentage responding "most people can't be trusted") was 43.2% (SD = 9.8%) across states. Low-trust states were defined as those 1.0 standard deviation above the mean (>54.0% responding "others can't be trusted"), whereas high-trust states were defined as those 1.0 standard deviation below the mean (<33.4%). The mean level of reciprocity (percentage stating "others are helpful") was 32.8% (SD = 6.0%); for per capita group membership, it was 1.77 (SD = 0.32). Each individual in the BRFSS sample was assigned to a social capital category (high, medium, or low) on the basis of their state of residence. With this approach, approximately 20% to 30% of the sample were placed in the high or low social capital states.

We then used SUDAAN to model the odds that an individual would report fair or poor health (as opposed to excellent, very good, or good health) according to their state of residence. Models simultaneously controlled for individual sociodemographic and lifestyle characteristics.

Results

Our BRFSS sample consisted of 167 259 individuals (41.7% male and 58.3% female). The sample sizes from each state ranged from 1259 (Wyoming) to 8800 (Maryland). Perceived health data were missing in just 386 (0.2%) individuals. Overall, 14.9% of individuals reported their health as being either fair (n = 17 651; 10.6%) or poor (n = 7163; 4.3%), whereas 84.9% reported their health as being excellent (n = 40 688; 24.3%), very good (n = 55 724; 33.3%), or good (n = 45 647; 27.3%). Table 1 shows the unweighted BRFSS sample characteristics and the percentage of subjects reporting fair or poor health. Consistent with previous reports,[19,20] perceived poor health was associated with Black race, lack of health insurance coverage, obesity, current smoking, lower household income, and lower educational attainment. There was an 8-fold gradient in the proportion of individuals reporting fair or poor health across levels of household income. States with low social capital also had higher proportions of residents who reported their health as being only fair or poor.

The ecological-level correlation between social mistrust and the percentage of residents in fair or poor health was 0.71 (P<.0001) (Figure 1). The corresponding correlations between perceptions of reciprocity and fair or poor health were –0.66 (P< .0001) and

TABLE 1—Characteristics of Behavioral Risk Factor Surveillance System Sample, 1993–1994

	n (%)	% Reporting Fair or Poor Health
Sex		
Male	69 694 (41.7)	13.3
Female	97 565 (58.3)	15.9
Race[a]		
White	143 521 (85.8)	14.2
Black	16 226 (9.7)	20.6
Other	7 352 (4.4)	15.6
Health insurance coverage[b]		
Yes	146 546 (87.6)	14.5
No	20 302 (12.1)	17.2
Health checkup in last 2 years		
Yes	136 233 (81.5)	15.9
No	31 026 (18.5)	10.3
Obese		
Yes	43 747 (26.2)	21.0
No	123 512 (73.8)	12.6
Current smoker	38 057 (22.8)	17.3
Nonsmoker[c]	128 777 (77.0)	14.1
Household income, $		
<10 000	24 300 (14.5)	32.4
10 000–14 999	14 989 (9.0)	24.3
15 000–19 999	14 047 (8.4)	16.9
20 000–24 999	15 105 (9.0)	13.2
25 000–34 999	23 418 (14.0)	9.4
35 000–49 999	25 024 (15.0)	6.3
≥50 000	29 183 (17.4)	4.3
Missing	21 193 (12.7)	18.6
Educational status		
No school	1 337 (0.8)	22.4
Elementary	9 397 (5.6)	46.1
Some high school	15 229 (9.1)	31.1
High school graduate	54 916 (32.8)	15.5
Some college/technical	44 034 (26.3)	10.1
College graduate	41 967 (25.1)	5.7
Missing	379 (0.2)	26.7
Living alone[d]		
Yes	41 707 (24.9)	21.1
No	125 351 (74.9)	12.4

Continued

–0.28 (P=.08) for per capita group membership. The social capital indicators were strongly correlated with each other: 0.78 (P< .0001) between mistrust and perceptions of reciprocity, –0.65 (P<.0001) between mistrust and per capita group membership, and –0.54 (P< .0003) between reciprocity and group membership.

We regressed individual health status on individual-level characteristics (Table 2). The strongest associations with fair or poor health were older age (e.g., OR = 4.79; 95% confidence interval [CI] = 4.51, 5.09 among individuals older than 65 years) and low income (OR = 6.02; 95% CI = 5.65, 6.41), when comparing individuals with household income less than $10 000 with those with income greater than $35 000. Living alone was associated with an odds ratio of 1.92 (95% CI = 1.33, 2.78).

In Table 3 (Model 1), we examined the associations of 3 sets of social capital variables to fair or poor health, adjusting for only demographic characteristics (age, sex, and race). Residing in a state with the lowest levels of social capital was associated with a 45% to 73% increased odds of fair or poor health, compared with living in the highest social capital states. In Model 2 (Table 3), we examined the contextual effects of social capital, adjusting for the full range of individual-level variables. Although the associations of social capital to fair or poor health were attenuated by the inclusion of individual-level predictors, they remained statistically significant. For example, living in areas with the lowest levels of trust was associated with an odds ratio for fair or poor health of 1.41 (95% CI = 1.33, 1.50), compared with living in the high social capital states (Table 3, Model 2). Although the proximate, individual-level factors turned out to be the strongest predictors of fair or poor health, the magnitude of risk associated with living in a low social capital state nonetheless approached that of risk factors such as being a current smoker (OR = 1.51) or being obese (OR = 1.70). The associations between social capital and perceived health did not change when we substituted educational attainment for household income in the multivariate models (data not shown).

There appeared to be a "dose–response" gradient in the odds ratios for fair or poor health across levels of social capital indicators. When we repeated Model 2 (Table 3) using quartile cutpoints for social capital instead of cutpoints defined by 1.0 standard deviation, the gradient became a little stronger (e.g., OR = 1.54; 95% CI = 1.47, 1.61, when comparing the lowest to highest quartile of trust).

The effects of social capital on perceived health were similar among men and women. Analyses were also stratified by different levels of household income (<$10 000, $10 000–$14 999, $15 000–$19 999, $20 000–$24 999, $25 000–$34 999, and ≥$35 000 per year). The largest effects of social capital on health were observed in individuals with the lowest income (<$10 000): the odds ratio for fair or poor health was 1.51 (95% CI = 1.32, 1.74) when low-trust states were compared with high-trust states. Nonetheless, an effect of social capital indicators on self-rated health was evident across most income groups, including among individuals from middle-class ranges of income (ORs = 1.40 and 1.18, respectively, among those earning $25 000–$34 999 and ≥ $35 000). Finally, we simultaneously examined the effects of household income inequality and social capital on self-rated health. Evidence both internationally[28,29] and from within single countries[30–32] has suggested that income inequality is an independent, ecological-level predictor of mortality and morbidity. Income distribution was measured by quartiles of the Gini coefficient derived from the 1990 census.[30,31] Simultaneously adjusting for income distribution attenuated the effects of social capital on self-rated health. Nevertheless, both the Gini and all 3 social capital indicators remained statistically significant predictors of self-rated health. For example, the odds ratio of fair or poor health for low-trust compared with high-trust states was 1.24 (95% CI = 1.15, 1.33), whereas the odds ratio for the highest income-inequality state compared with the lowest income-inequality state was 1.24 (95% CI = 1.16, 1.32). (Tables of stratified analyses are available from the authors on request.)

TABLE 1—*Continued*

	n (%)	% Reporting Fair or Poor Health
Residence in states characterized by		
Low trust[e]	25 060 (15.0)	19.1
Medium trust	123 761 (74.0)	13.2
High trust	18 438 (11.0)	11.6
Low reciprocity[f]	25 270 (15.1)	18.8
Medium reciprocity	117 632 (70.3)	13.4
High reciprocity	24 357 (14.6)	10.7
Low group membership[g]	15 198 (9.1)	17.5
Medium group membership	134 759 (80.6)	13.9
High group membership	17 302 (10.3)	11.6

[a]Race data missing in 160 individuals.
[b]Health insurance status missing in 411 individuals.
[c]Smoking status missing in 425 individuals.
[d]Living status missing in 201 individuals.
[e]Percentage responding on the General Social Surveys that "most people can't be trusted."
Low-trust states were AL, AR, LA, MS, TN, WV (mean % mistrust = 59.4%; range: 56.0%–61.6%).
Medium-trust states were AK, CA, CO, CT, FL, GA, IL, IN, IA, KY, MD, MA, MI, MO, NH, NJ, NY, NC, OH, OK, OR, PA, RI, SC, TX, UT, VA, WA (mean % mistrust = 42.9%; range: 33.4%–51.7%).
High-trust states were KS, MN, ND, WI, WY (mean % mistrust = 26.7; range: 21.2%–32.6%).
[f]Percentage endorsing statement on the General Social Surveys that "most people look out for themselves."
Low-reciprocity states were AR, GA, LA, MS, TN, WV (mean % endorsing statement = 44.2%; range: 41.4%–51.5%).
Medium-reciprocity states were AL, AK, CA, CO, CT, FL, IL, IN, KS, KY, MD, MA, MI, MO, NJ, NY, NC, OH, OK, OR, PA, RI, SC, TX, UT, VA, WA, WY (mean % endorsing statement = 33.0%; range: 26.6%–38.8%).
High-reciprocity states were IA, MN, NH, ND, WA (mean % endorsing statement = 22.0%; range: 19.8%–24.2%).
[g]Per capita membership in voluntary associations, according to General Social Surveys.
Low-membership states were AL, AR, LA (mean number per capita groups = 1.3; range: 1.2–1.4).
Medium-membership states were AK, CA, CO, CT, FL, GA, IL, IN, IA, KY, MD, MA, MI, MN, MS, MO, NH, NJ, NY, NC, OH, OK, OR, PA, RI, SC, TN, TX, VA, WV, WI (mean number per capita groups = 1.7; range: 1.4–2.0).
High-membership states were KS, ND, UT, WA, WY (mean number per capita groups = 2.6; range: 2.2–3.5).

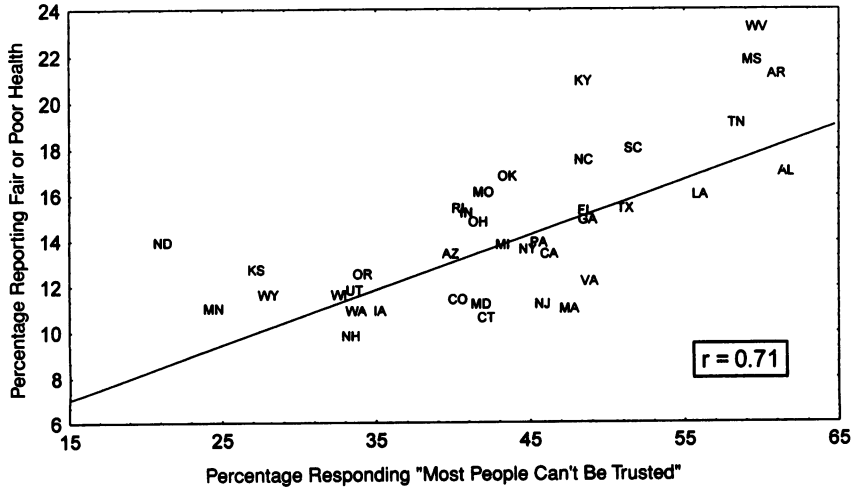

FIGURE 1—Scatterplot of levels of interpersonal trust and percentage of residents in each state reporting fair or poor health, Behavioral Risk Factor Surveillance System, 1993–1994.

Discussion

Mechanisms Linking Social Capital to Health

The mechanisms linking social capital to health outcomes have yet to be elucidated. Ample evidence suggests that socially isolated *individuals* are at increased risk for poor health outcomes because of their limited access to resources such as instrumental aid, information, and emotional support.[10,11,33] However, the mechanisms linking social capital to health might be different from those linking social networks to individual health. Here it is important to distinguish between the *contextual* effects of living in an area depleted of social capital and any *compositional* effects of social capital. An ecological-level correlation between social capital and poor health could be explained by the fact that more socially isolated individuals reside in areas lacking in social capital (a compositional effect). Socially isolated individuals are more likely to be concentrated in communities that are depleted in social capital because such places provide fewer opportunities for individuals to form local ties.[34,35] A limitation of our analysis is that we failed to account for individual-level indicators of social isolation (e.g., not having contacts with friends or relatives, not attending church, or not belonging to groups). Hence, we could not rule out a compositional effect of social capital on self-rated health.

The more challenging task is to identify the mechanisms by which social capital may exert a contextual effect on individual health. Social capital may affect health through different pathways depending on the geographic scale at which it is measured (e.g., neighborhoods vs states). Although this study did not measure social capital in neighborhoods, social capital might influence individual health at this level via at least 3 plausible pathways. First, social capital may influence the health behaviors of neighborhood residents by (1) promoting more rapid diffusion of health information,[36] (2) increasing the likelihood that healthy norms of behavior are adopted (e.g., physical activity), and (3) exerting social control over deviant health-related behavior. The theory of the diffusion of innovations[36] suggests that innovative behaviors (e.g., use of preventive services) diffuse much more rapidly in communities that are cohesive and in which members know and trust one another.

Alternatively, recent evidence from criminology[6] also suggests that the extent to which neighbors are willing to exert social control over deviant behavior (a characteris-

TABLE 2—Associations Between Individual-Level Variables and Fair or Poor Self-Rated Health: Behavioral Risk Factor Surveillance System, 1993–1994

	Odds Ratio for Fair or Poor Health (95% Confidence Interval)
Age, y	
<25	0.74 (0.67, 0.81)
25–39	1.00
40–64	2.38 (2.26, 2.51)
≥65	4.79 (4.51, 5.09)
Male	1.05 (1.01, 1.09)
Race	
White	1.00
Black	1.37 (1.30, 1.44)
Other	1.42 (1.31, 1.53)
Health insurance coverage	0.73 (0.69, 0.77)
Recent checkup	1.39 (1.32, 1.47)
Obese	1.70 (1.64, 1.76)
Current smoker	1.51 (1.45, 1.58)
Income, $	
<10 000	6.02 (5.65, 6.41)
10 000–14 999	4.33 (4.40, 4.64)
15 000–19 999	3.30 (2.82, 3.26)
20 000–24 999	2.43 (2.26, 2.61)
25 000–34 999	1.88 (1.76, 2.01)
≥35 000	1.00
Missing	3.00 (2.82, 3.20)
Living alone	1.92 (1.33, 2.78)

tic that Sampson et al.[6] termed *collective efficacy*) may be critical for the prevention of delinquency and crime. In turn, levels of collective efficacy are determined by the extent of trust in a neighborhood (or what we term *social capital*). We conjecture that collective efficacy may also help to prevent other forms of deviant behavior, such as adolescent smoking and drinking.

Second, neighborhood social capital may influence health by increasing access to local services and amenities. Again, evidence from criminology suggests that socially cohesive neighborhoods are more successful at uniting to ensure that budget cuts do not affect local services.[6] The same kind of organizational processes could conceivably ensure access to services such as transportation, community health clinics, or recreational facilities, which are directly relevant to health.

Finally, neighborhood social capital may influence the health of individuals via psychosocial processes, by providing affective support and acting as the source of self-esteem and mutual respect.[29] Variations in the availability of psychosocial resources at the community level may help to explain the anomalous finding that socially isolated individuals residing in cohesive communities (such as East Boston,[37] African Americans in rural Georgia,[38] or Japanese Americans in Hawaii[39]) do not appear to have the same ill health consequences as those living in less cohesive communities.

Each of these 3 mechanisms is empirically testable and merits further investigation. For mechanisms linking social capital at the *state* level to individual health (the subject of the current investigation), we hypothesize that more cohesive states produce better health via more egalitarian patterns of political participation that result in the passage of policies that ensure the security of all members.[3,40] Putnam[2] showed that social capital (measured by the same indicators used in the present study) is indispensable to the responsiveness and smooth functioning of civic institutions. Low levels of interpersonal trust correlate strikingly with low levels of trust and confidence in public institutions,[41] low levels of political participation (as measured by voting and other forms of engagement in politics),[2,3,42] and, ultimately, reduced efficacy of government institutions.[2]

Our data indicate that states with low levels of interpersonal trust are less likely to invest in human security and less likely to be generous with their provisions for social safety nets. For example, mistrust was highly inversely correlated ($r = -0.76$) with the maximum welfare assistance as a percentage of per capita income in each state. Less generous states are likely to provide less hospitable environments for vulnerable segments of the population. Work is under way to document the links between social capital, political participation, and health outcomes.

Caveats and Limitations

Despite considerable progress in the conceptualization of social capital, some important caveats remain. First, the tendency is to regard social capital as an unqualified social good.[43] Various commentators have warned against the tendency to overlook some of the more coercive and exclusive aspects of social capital.[43,44] For instance, criminal organizations may provide social capital for their members but may contribute little to (or may be frankly destructive of) social cohesion.[45] Some forms of social capital may stifle individual choice, whereas other forms may not be available to all members of a community. Interestingly, we found that membership in civic organizations was the most weakly associated with self-rated health. This finding may suggest that a crude count of group membership is an imperfect measure of social capital.

Civic associations vary along important dimensions that predict their contribution to overall social cohesion (R. Putnam, oral communication, June 1997). Thus, some groups may be more exclusive in their membership, compared with others that bridge social divisions along the lines of class, sex, and race/ethnicity; some associations have a mission that is more self-regarding (e.g., hobby groups) than other-regarding (e.g., charities); some associations are more likely to foster civic trust by encouraging face-to-face contact, whereas others merely involve the payment of membership dues, and so on. An important research task is to determine which characteristics are important for health.

Beyond these broad caveats, several specific limitations of our study should be noted. First, despite attempts to take account of a range of individual-level factors that determine self-rated health, the analyses may have omitted other variables that could account for the apparent contextual effect of social capital. It is important that measures of social networks (beyond living arrangement) were unavailable in the BRFSS data set because we could not rule out the possibility that the observed "contextual" effect was due to more socially isolated individuals residing in low social capital states.

The sampling frame of the General Social Surveys is based on primary sampling units, consisting of counties, metropolitan statistical areas, and independent cities.[46] The 39 states in our General Social Survey sample were covered by 84 primary sampling units. Thus, in several less populous states (e.g., Wyoming, North Dakota, Rhode Island, Kentucky), a whole state could be "represented" by a single primary sampling unit. Although the primary sampling units in such states tend

TABLE 3—Associations Between Social Capital Variables and Fair or Poor Self-Rated Health: Behavioral Risk Factor Surveillance System, 1993–1994

	Odds Ratio (95% Confidence Interval) for Fair or Poor Health	
	Model 1[a]	Model 2[b]
Low trust	1.67 (1.56, 1.75)	1.41 (1.33, 1.50)
Medium trust	1.41 (1.35, 1.45)	1.14 (1.08, 1.21)
High trust	1.00	1.00
Low reciprocity	1.69 (1.61, 1.79)	1.48 (1.41, 1.57)
Medium reciprocity	1.33 (1.28, 1.39)	1.24 (1.19, 1.30)
High reciprocity	1.00	1.00
Low group membership	1.43 (1.34, 1.55)	1.22 (1.14, 1.32)
Medium group membership	1.18 (1.13, 1.25)	1.11 (1.05, 1.16)
High group membership	1.00	1.00

[a]Adjusted for age group (<25, 25–39 [reference], 40–64, ≥65 years), sex, and race.
[b]Adjusted for age group (<25, 25–39 [reference], 40–64, ≥65 years), sex, race, household income (<$10 000, $10 000–$14 999, $15 000–$19 999, $20 000–$24 999, $25 000–$34 999, ≥ $35 000 [reference]), living alone, current smoking status, obesity, health insurance coverage, and health checkup in last 2 years.

to be metropolitan areas where typically a high proportion of the state's population lives, great caution should be exercised in interpreting our General Social Survey estimates of social capital, which may be biased. In addition, we were able to account for a limited number of variables (age, education, race) in assessing the extent of representativeness of the state-level estimates derived from this national survey. Respondents in the General Social Survey may have differed in other important ways (e.g., urban vs rural residence) that could have biased the state-level estimates.

Finally, our estimates of social capital were measured at a different time (1986–1990) than the outcome variable (1993–1994). Although this difference preserves the temporal order of the hypothesized association (social capital→self-rated health), it may have introduced misclassification of the "exposure." Social capital in American society has been declining during the last 30 years.[45,47] If the gap in social capital across states widened in recent years, then use of data from an earlier period may have underestimated the degree of association between social capital and health. Also, the direction of causality cannot be established firmly with the present design. Thus, some states may have a higher share of citizens with poor health (for various reasons), and illness may lead to civic disengagement, not vice versa. A study with repeated waves of data collection on social capital and health is needed to establish unequivocally the causal direction. □

Contributors

I. Kawachi and B. P. Kennedy conceived and designed the study, interpreted the data, and wrote the manuscript. R. Glass analyzed the data and participated in interpreting data and writing the manuscript.

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