

SHORT REPORT

Social capital, poverty, and income inequality as predictors of gonorrhoea, syphilis, chlamydia and AIDS case rates in the United States

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Background: Social capital has been related to a number of important public health variables such as child welfare, mortality, and health status. However, the relation of social capital to *infectious* diseases has received relatively little attention. The relation of social capital to health measures is often posited to be related to the key societal variables of poverty and income inequality. Therefore, any exploration of the correlation between social capital and infectious diseases should also include examination of the association with poverty and income inequality.

Objective: This study examined the state level association between social capital, poverty, income inequality, and four infectious diseases that have important public health implications given their long term sequelae: gonorrhoea, syphilis, chlamydia, and AIDS.

Method: A state level, correlational analysis (including bivariate linear correlational analysis, and multivariate linear stepwise regression analysis) was carried out. 1999 state level rates of gonorrhoea, syphilis, chlamydia, and AIDS were the main outcome measures.

Results: In bivariate analyses, poverty was significantly correlated with chlamydia; income inequality was significantly correlated with chlamydia and AIDS case rates; and social capital was significantly correlated with all outcome measures. In stepwise multiple regression analyses, social capital was always the strongest predictor variable.

Conclusions: These results suggest that social capital is highly predictive of at least some infectious diseases. The results indicate the need for further research into this relation, and suggest the potential need for structural interventions designed to increase social capital in communities.

Social capital is a construct that has been given much recent attention.^{1–7} As noted by Putnam, “. . .the core idea of social capital theory is that social networks have value” (pp 18–19).² Social capital can be contrasted with physical and human capital.² The term has been redefined numerous times but central factors generally include trust, reciprocity, and cooperation among members of a social network that aims to achieve common goals.^{1,2} The literature contains extensive discussions of the definitions and uses of the term “social capital,”^{1–9} including a specific discussion of Putnam’s usage of the construct.⁸

Social capital has been related to a number of important public health variables such as child welfare, violent behaviour, mortality, and health status.^{1–3,10,11} In general, the more social capital, the better the public health measure (however, social capital can have negative effects if the mutual goals of a group are harmful to society—for example, a hate group may have high social capital yet work to achieve goals that hurt others).

Several causal mechanisms have been postulated for the linkages between social capital and health: (a) social isolation has been linked to poor health and socially isolated individuals tend to live in areas low in social capital; (b) social capital may influence healthy behaviours, in part, by establishing social norms supporting those behaviours; (c) social capital may lead to the development of, and foster accessibility to, healthcare services; (d) social capital may foster mutual trust and respect leading residents of an area to take more responsibility for each other; and (e) social capital may foster egalitarian democratic political participation and thereby lead to the development of policies that protect all citizens.³

Within the literature on social capital and public health, however, the relation of social capital to *infectious* diseases has received relatively little attention.¹² Cohen *et al* correlated gonorrhoea rates at the block level with a “broken windows” index that could be a proxy for the lack of social capital in a community.¹³ Thomas and Thomas observed that migration patterns appeared to contribute to racial disparities in sexually transmitted disease in a rural county, and they postulated that these migration patterns served to erode the social capital of the community.¹⁴

The relation between social capital is especially interesting to explore because while social capital would seem to build the social infrastructure for a community to prevent and respond to infectious disease outbreaks, higher levels of trusting social interactions also could lead to increased opportunities for disease transmission.

The association of social capital with health measures is often posited to be related to, or mediated by, the key societal variables of poverty and income inequality.^{2,10,11,15} Therefore, any exploration of the correlation between social capital and infectious diseases should include examination of the interrelations with poverty and income inequality as well.

Accordingly, this paper examines the state level association between social capital, poverty, income inequality and four infectious diseases that have important public health implications given their long term sequelae: gonorrhoea, syphilis, chlamydia, and AIDS. This set of diseases comprises all of the nationally notifiable sexually transmitted diseases in the United States. Although it would be more desirable to examine HIV infection rates, these are not available for all states.¹⁶

METHODS

State level correlational analyses were employed. Gonorrhoea, syphilis, chlamydia, and AIDS case rates per 100 000 population (by state) for 1999 were obtained from federal surveillance documents.^{16–18} The measure of social capital was obtained from Putnam’s public use dataset.¹⁹ It is meant to be a comprehensive snapshot of social capital at the state level in the 1990s. The measure is a combination of 14 variables that span the domains of community organisational life, involvement in public affairs, volunteerism, informal sociability, and social trust.^{2,19}

Table 1 Pearson product moment correlation coefficients between societal variables and 1999 infectious disease rates (across 48 states)*

Societal variable		Gonorrhoea rate	Syphilis rate	Chlamydia rate	AIDS case rate
Poverty	<i>r</i>	0.204	0.232	0.358	0.099
	<i>r</i> ²	0.042	0.054	0.128	0.010
	p value	>0.01	>0.01	<0.01	>0.01
Social capital	<i>r</i>	-0.671	-0.591	-0.532	-0.498
	<i>r</i> ²	0.450	0.349	0.283	0.248
	p value	<0.01	<0.01	<0.01	<0.01
Income inequality	<i>r</i>	0.203	0.133	0.395	0.469
	<i>r</i> ²	0.041	0.018	0.156	0.220
	p value	>0.01	>0.01	<0.01	<0.01

*All significance tests of bivariate correlations were one tailed; degrees of freedom = 46.

Table 2 Stepwise multiple linear regression model predicting aids case rates, 1999 (across 48 states)

Predictor*	Standardised coefficient	t statistic	p value	Partial R ²
Intercept term	0	-0.83	0.4109	
Social capital	-0.362	-2.67	0.0104	0.248
Income inequality	0.313	2.31	0.0258	0.080

*Analysis allows variables to enter the multivariate equation if p < 0.05. Model fit: multiple R² = 0.327; adjusted R² = 0.297; F(2,45) = 10.94 [p < 0.01].

The poverty measure represents the years 1997–8 and is expressed as the percentage of each state's population living in poverty; it was obtained from federal publications.^{20, 21} Income inequality was measured (by state) as the ratio of mean income for the top earning one fifth of families to the bottom one fifth. This ratio was calculated by the Center on Budget and Policy Priorities/Economic Policy Institute using data from the US Census Bureau's 1996–8 Current Population Survey.²² Values for all variables were available for the 48 contiguous states.

The bivariate relation between each predictor variable and each outcome measure was assessed by calculating linear correlation coefficients with a type I error rate (α) of 0.01. For each disease outcome measure with more than one significant bivariate predictor, forward stepwise linear multiple regression was performed. For each such outcome, all bivariate significant predictors were candidates to enter the multiple regression equation; a candidate predictor variable could enter and remain in the multivariate equation if the p value associated with its multivariate regression coefficient was 0.05 or less. Analyses were performed using Microsoft Excel 2000 and SAS 8.2.

RESULTS

Table 1 displays the bivariate findings. Social capital was the only significant predictor for gonorrhoea and syphilis; the more social capital the lower the disease rates. The variance explained by social capital for gonorrhoea and syphilis is quite large (45.0% and 34.9%, respectively).

All three predictor variables have significant bivariate associations with chlamydia rates. The stepwise multiple linear regression performed for chlamydia found that only social capital entered the regression equation (although all three predictor variables were candidates to enter the equation).

Both social capital and income inequality are significantly correlated with AIDS case rates. The more social capital, the lower the AIDS case rate; the more income inequality, the higher the AIDS case rate. The stepwise regression analysis performed for AIDS case rates used social capital and income inequality as candidate predictors. At an entry level of 0.01,

only social capital entered the equation; at an entry level of 0.05, both social capital and income inequality entered the regression equation. Table 2 displays the results of the latter stepwise multiple regression analysis; social capital is the stronger of these two predictor variables for AIDS case rates.

CONCLUSIONS AND DISCUSSION

This exploratory analysis indicates that social capital (as measured by Putnam¹⁹) is strongly related to the rates of four important infectious diseases. The observed correlations are sufficiently strong to prompt further work in this area. For instance, future research may include the refinement of a theoretical framework linking demographic and other predictor variables to the societal level predictor variables analysed here so as to guide additional, more expansive analyses.²³

The study presented here offers a method of analysis that can be used by other researchers interested in alternative measures of the predictor variables. For instance, the income inequality and public health literature contains several alternative measures of income inequality.^{24–26} In sensitivity analyses not presented in this brief report, we examined the relation between the 1989 state level Gini coefficient (calculated from census data (an often used measure of income inequality) and found that although it had a somewhat stronger relation with some STDs than did the ratio measure used here, social capital was still a stronger predictor for all four diseases. (Conceptually, we prefer the income inequality measure used here because it is more closely related in time with the disease outcomes for 1999.)

Although definitive causal associations between these constructs cannot be inferred from these data, the correlational relations are sufficiently strong to warrant further exploration of potential causal linkages. This is ideally done via experimental and quasiexperimental manipulation of the putative causal factor (albeit the manipulation of social capital is a considerable challenge). Some HIV related research has been done regarding the construction of structural interventions based in part on social capital²⁷; however, much more work needs to be done to prospectively examine the influence of social capital on STDs.

Interventions to increase social capital may involve societal, community, and individual level components.¹ Indeed, recent research on HIV related *behaviours* at the individual level suggests that African-American adolescent females' membership in social organisations is protective against their involvement in risky sexual behaviours;²⁸ research from South Africa suggests that the type of organisation to which one belongs may alter the direction of this relation.²⁹ Therefore, programmes to foster social capital could involve multiple change agents including physicians, public health officials, policy makers, and other community leaders.

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