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Loosening the Link Between Childhood Poverty and Adolescent Smoking and Obesity: The Protective Effects of Social Capital

Gary W. Evans[1,2] and Rachel Kutcher[2]
[1]Department of Design & Environmental Analysis and [2]Department of Human Development, Cornell University

Abstract

Pervasive, lifelong inequalities in physical health begin in early childhood and are driven, in part, by social gradients in risk factors such as smoking and obesity. Yet not all low-income children have elevated physical-health risks as adults. The relation between income-to-needs ratio at age 9 and smoking prevalence and body fat (body mass index) at age 17 was examined in a sample of 196 rural adolescents. Income-to-needs ratio is the U.S. federal government's defined index of household income as a proportion of the poverty line. This is the first study to show that links between childhood poverty and subsequent physical-health outcomes can be loosened. At-risk youth in communities with a relatively rich array of social capital did not smoke more or have greater excess body fat compared with their more affluent counterparts.

Keywords

poverty, smoking, obesity, social capital

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Socioeconomic health inequalities are ubiquitous (Adler & Rehkopf, 2008; MacArthur Network on SES and Health, 2007) and begin early in childhood (Chen, Matthews, & Boyce, 2002). Given pervasive social gradients in health over the life course, multiple mechanisms likely underlie these health disparities. Two risk factors that reflect socioeconomic status (SES) gradients are smoking (Jha et al., 2006; Lynch, Kaplan, & Salonen, 1997) and body mass index (BMI; Adler & Stewart, 2009; Sobal & Stunkard, 1989). Furthermore, social gradients in smoking and BMI begin in childhood (Blane et al., 1996; Goodman & Huang, 2002; Lowry, Kann, Collins, & Kolbe, 1996; Strauss & Knight, 1999). Yet not all low-SES youth develop tobacco addiction or food-energy imbalance. We hypothesized that communities with relatively rich social capital loosen the link between childhood poverty, on the one hand, and adolescent smoking and excess body fat, on the other.

Social capital is a multidimensional construct comprising community cohesion and social control in the community, along with social relationships between community members. Considerable interest in social capital has been generated because of its beneficial effects on psychological and physical health (Almedon, 2005; Kawachi & Berkman, 2000; Leventhal & Brooks-Gunn, 2000; Sampson, Morenoff, & Ganon-Rowley, 2002). Another potentially valuable function of social capital, in addition to its direct effects on well-being, is its potential to buffer the adverse effects of personal risk factors on well-being (Cutrona, Wallace, & Wesner, 2006; Saegert, Thompson, & Warren, 2001; Wandersman & Nation, 1998). The scant empirical work on protective effects of social capital has focused on mental health in high-risk, urban samples (Furstenberg & Hughes, 1995; Saegert et al., 2001). A true test of the protective effects of social capital, however, requires an investigation of its statistical interaction with risk factors. In this article, we offer such an analysis.

We hypothesized that the protective effects of community youth resources on adolescent smoking and BMI ought to be most potent among individuals at greatest risk for engaging in health-damaging behaviors (Shonkoff, Boyce, & McEwen, 2009). Furthermore, we tested this hypothesis in a sorely neglected setting, rural America. This setting is particularly important to our moderator hypothesis, given that individual- and community-level risks and resources are highly collinear

Corresponding Author:
Gary W. Evans, Departments of Design & Environmental Analysis and of Human Development, Cornell University, Ithaca, NY 14850
E-mail: gwe1@cornell.edu

in urban settings (Wilson, 1987), rendering tests of the protective impact of social capital on low-income populations insensitive. Rural communities, unlike urban ones, manifest wide dispersion of low-income households among middle- and upper-income areas. Furthermore, rural poverty is more prevalent and is growing faster than urban poverty in America (Carsey Institute, 2006; Lichter & Crowley, 2002). In summary, we hypothesized that the well-documented effect of childhood poverty on the health risks of smoking and obesity would be attenuated among low-income, rural youth living in communities with greater social capital.

Method

Participants

Data on social capital, smoking, and BMI were obtained for 196 adolescents (mean age = 17.42 years; 50% female, 50% male). The sample was drawn from several rural counties in upstate New York. Low-income participants were oversampled so that approximately half of the sample was below the poverty line (income-to-needs ratio ≤ 1). The income-to-needs ratio is an annually adjusted, per capita index comparing household income with U.S. federal estimates of minimally required expenditures. The average income-to-needs ratio of the sample at the time of this study was 2.80. Participants had initially been recruited at age 9 from local public schools and various programs targeted for low-income families. Forty-eight different high schools and 32 communities were represented, with the number of students per community ranging from 1 to 15.

Procedure

The frequency of smoking was assessed by participants' self-report of their frequency of cigarette consumption (from 0, *none*, to 7, *more than once per day*). Test-retest reliability (1 month) for this index was solid, $r = .92$. Height and weight were measured by a trained experimenter, and BMI was calculated (kilograms/meter^2). Age- and gender-normed percentiles for BMI were then calculated with the SAS Program for the CDC Growth Charts (Centers for Disease Control and Prevention, 2010).

An index of social capital was calculated across three domains: community cohesion, social control, and youths' relationships with adults in the community. Per capita estimates in each domain were adjusted for the size of the community. Then, each community received a score of 1 for a given domain if the community's level of resources was greater than 1 standard deviation above the mean for that particular domain across the entire sample of communities. A score of 0 was assigned if the community's level of resources was lower than that criterion. Thus, the overall social-capital index ranged from 0 to 3. The first domain, community cohesion, was assessed by maternal ratings of social ties and interdependence among community members ($\alpha = .91$). The 12 items (e.g., "People in this community share the same values") were rated on a 5-point Likert scale (from *strongly disagree* to *strongly agree*; Brody et al., 2001; Cutrona, Russell, Hessling, Brown, & Murry, 2000; Elliott et al., 1996). The second domain, informal social control, was assessed by maternal ratings of the extent of informal adult supervision of youth and adults' willingness to intervene ($\alpha = .80$). The 10 items on this measure (e.g., "One of my neighbors would do something if they saw someone trying to sell drugs to a child or youth in plain sight") were rated on the same 5-point Likert scale used for community cohesion (Brody et al., 2001; Cutrona et al., 2000; Simons, Johnson, Conger, & Lorenz, 1997). The third domain, youths' relationships with adults in the community, was measured by youths' ratings of how supportive their relationships with adults were ($\alpha = .81$). The 7 items on this measure (e.g., "I feel there are adults at my school I could talk with if I needed help or advice") were rated on the same 5-point Likert scale used for the other domains of social capital (Whitlock, 2007).

Results

The main and interactive effects of childhood income and social capital were analyzed with ordinary least squares regression, maintaining the continuous values of each of these variables. Childhood income and social capital were grand-mean-centered. All analyses incorporated gender and median community income level as covariates. Gender is often correlated with smoking and BMI, and social capital in urban settings has been repeatedly linked to community income levels. Neither gender nor median community income level interacted with either of the independent variables (childhood income and social capital).

For descriptive purposes, we plotted BMI percentiles and smoking frequency at age 17 against income-to-needs ratio at age 9, separately for low, medium, and high levels of social capital (1 *SD* below the mean, at the mean, and 1 *SD* above the mean, respectively). As indicated in the left panel of Figure 1, higher social capital attenuated smoking among 17-year-old youth from lower-income households, $b = 0.66$ ($SE = 0.22$), $p < .001$. There was also a significant main effect of early childhood income level on adolescent smoking, $b = -0.66$ ($SE = 0.17$), $p < .001$. Social capital was not directly related to smoking frequency, $b = -0.24$ ($SE = 0.24$), $p > .3$. Youth from low-income backgrounds smoked more than those who grew up in more affluent homes. However, if they resided in communities with high social capital, the effects of early childhood poverty on adolescent smoking were minimal.

A similar pattern was uncovered for BMI among 17-year-olds. As shown in the right panel of Figure 1, youth from more disadvantaged households had higher BMIs than those from more affluent families, but only when social capital was low, $b = 5.16$ ($SE = 2.49$), $p < .05$. Childhood income was significantly related to BMI at age 17, $b = -1.44$ ($SE = 0.41$), $p < .001$, and social capital was marginally related to BMI at age

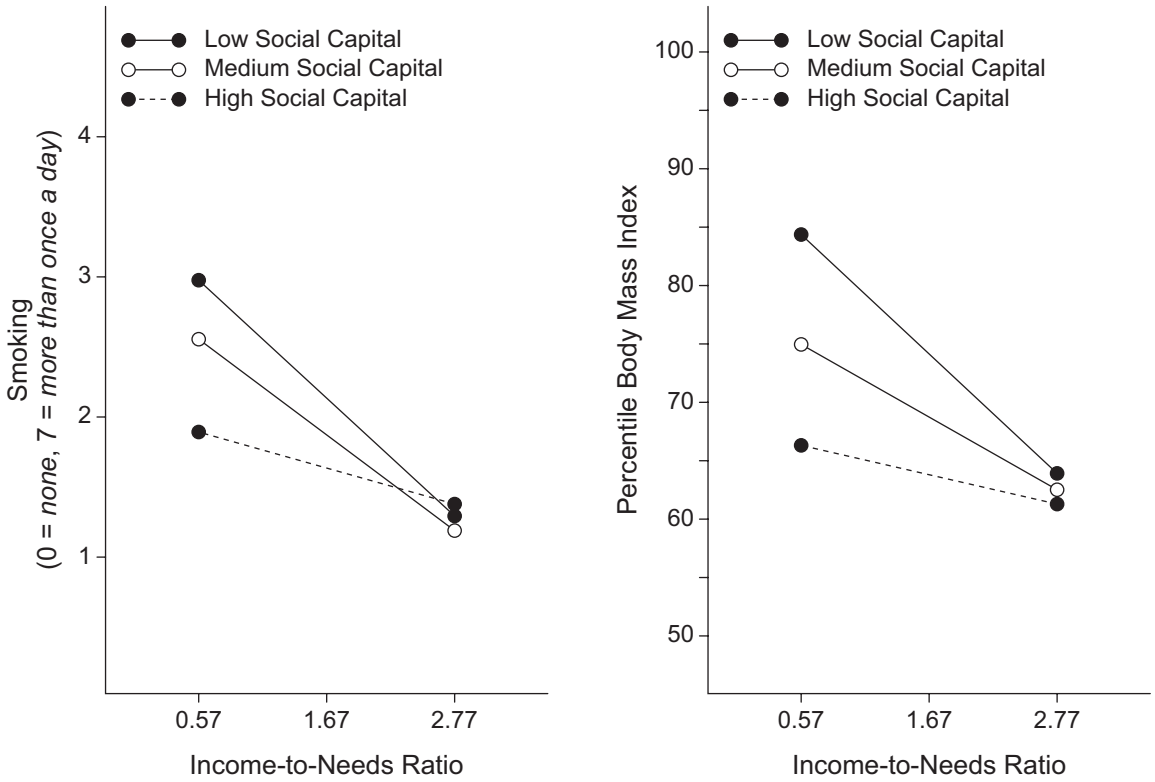

Fig. 1. Smoking frequency (left panel) and body mass index (right panel) among 17-year-olds as a function of income-to-needs ratio at age 9 and the community's level of social capital. Functions are graphed for three levels of social capital: 1 standard deviation above the mean, at the mean, and 1 standard deviation below the mean. Note that the graphs are for descriptive purposes only. All inferential analyses maintained the continuous values of childhood income-to-needs ratio and social capital.

17, $b = -4.79$ ($SE = 2.59$), $p < .07$. Young adults from low-income backgrounds had more body fat than their more affluent counterparts, but this was not true if they resided in communities with abundant social capital.

Supplemental analyses that controlled for parental education, maternal marital status, maternal mental health, and residential relocation, in addition to gender and median community income, yielded the same pattern of results. We also examined whether community characteristics other than social capital might be important. The inclusion of a host of other community characteristics (i.e., percentage Hispanic, percentage foreign born, percentage of owner-occupied households, percentage of high school graduates, percentage of college graduates, percentage unemployed) made no difference in the interaction results. Two additional indices of community resources were also examined as potential moderators of the effects of childhood income level on young adults' BMI and smoking. A composite index of school quality and the number of domains of extracurricular activities provided to youth were examined in concert with social capital. Only social capital functioned as a significant buffer of the effects of childhood poverty on smoking and BMI. Finally, we examined whether any one of the three domains of social capital (community cohesion, social control, youths' relationships with adults) drove the Social Capital × Childhood Poverty interaction. None did so. Only the cumulative index of the three domains interacted with childhood poverty to protect children from adolescent smoking and obesity.

Discussion

Adolescents growing up in low-income households smoke more and have greater body mass than youth from more affluent households. This study extends prior research on SES and health risks among urban children (Blane et al., 1996; Goodman & Huang, 2002; Lowry et al., 1996; Strauss & Knight, 1999) to a rural context. More important, we have shown that low-income youth are less likely to manifest either of these major health risks if they live in a rural community with more social capital. As Figure 1 illustrates, communities with more social capital attenuate the impact of childhood poverty on smoking frequency and body fat. To our knowledge, this is the first empirical demonstration of a social factor that protects against adverse physical-health sequelae of childhood poverty.

Not only do early resources directly affect health trajectories (Shonkoff et al., 2009), but they can also alter health-risk trajectories. Although childhood poverty elevates health risks over the life course, there is considerable variability in health outcomes among individuals at risk. Some of this variability is

likely due to the ecological context in which low-income children are embedded. From a policy perspective, it would be considerably cheaper to enhance social capital than to bear the costs of youth smoking and obesity to the nation's long-term health and productivity (Knudsen, Heckman, Cameron, & Shonkoff, 2006).

Some limitations in this study warrant comment. The data are not from a randomized experiment, and causal conclusions cannot be drawn. Some parents might choose to raise their children in a community with greater resources, thus creating selection bias. It is also possible that some other community characteristic, in addition to social capital, drove the observed interactions. Although we statistically controlled for the most likely alternative explanations and checked the robustness of the findings across additional analyses, the buffering effects of social capital on smoking and obesity among children growing up poor need to be replicated with a stronger experimental or quasi-experimental research design. A larger sample of youth with better distribution across communities would also enable a multilevel statistical analysis, given the embedded data structure. Because most of the youth in our study did not move or relocated within the same community when they did move, we could not determine whether or not there is a critical time period for exposure to social capital that may change the impact of childhood poverty. With these caveats in mind, the present data reveal for the first time that the impact of childhood poverty on lifelong physical health may be modulated by social resources. Rural adolescents growing up in lower-income households have higher BMI and smoke more than their more affluent counterparts. These health inequalities, however, appear to be diminished by relatively rich social capital in the youths' communities.

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Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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