

Socioeconomic and Racial-ethnic Disparities in Prosocial Health Attitudes: The Case of Human Papillomavirus (HPV) Vaccination for Adolescent Males

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Abstract

Research on prosocial attitudes, social networks, social capital, and social stratification suggest that lower-socioeconomic status (SES), Hispanic, and nonwhite individuals will be more likely than their higher-SES and non-Hispanic white counterparts to engage in health behaviors that serve a social good. Analyzing data from the University of North Carolina Human Papillomavirus (HPV) Immunization in Sons Study, we test whether SES and race-ethnicity are associated with willingness to vaccinate via prosocial attitudes toward HPV vaccination among adolescent males ($n = 401$) and parents ($n = 518$). Analyses revealed that (a) parents with lower education and (b) black and Hispanic parents and adolescent males reported higher prosocial vaccination attitudes, but only some attitudes were associated with higher willingness to vaccinate. We discuss these findings in terms of how prosocial attitudes may motivate certain health behaviors and serve as countervailing mechanisms in the (re)production of health disparities and promising targets of future public health interventions.

Keywords

health disparities, HPV vaccine, prosocial attitudes, race-ethnicity, socioeconomic status, vaccination

Substantial evidence indicates that individuals of lower socioeconomic status (SES) and marginalized race-ethnicity experience increased risk for morbidity and mortality from chronic and infectious diseases (Carpiano, Link, and Phelan 2008; Williams and Mohammed 2009). Efforts to identify mechanisms underlying these disparities have focused on how SES and race-ethnicity influence access to material and psychosocial resources and conditions that can, in turn, contribute to different health lifestyles and, ultimately, to health risks and outcomes (Carpiano et al. 2008; Cockerham 2013). Recently, medical sociologists have also considered the role of *spillover effects*, whereby the actions of members

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of one's family or social network confer benefits or risks to one's health and contribute to reproducing health disparities (Freese and Lutfey 2011). Our study contributes to this scholarship by considering how SES and racial-ethnic differences in prosocial attitudes may relate to certain health-related decisions that have potential health spillover effects.

The term "prosocial" means a benefit to others that may or may not also benefit the self (Swap 1991). Attitudes are generally defined as judgments of objects of thought (e.g., of things, people, groups, or ideas), and substantial research suggests that attitudes affect behaviors (Bohner and Dickel 2011). While prosocial health behaviors are quite varied, examples include using condoms to avoid transmitting infections, donating blood to save others' lives, or being vaccinated to prevent spreading disease. Prosocial behavior research suggests that individuals who possess fewer material resources may act in a more prosocial manner (Piff et al. 2010). Likewise, sociological research on social networks, social capital, and status groups offers insights as to why social position-based differences in prosociality may exist. Together, these literatures offer an exciting new direction for hypothesizing about mechanisms through which social position may influence willingness to engage in certain health behaviors and testing whether SES and race-ethnicity are associated with prosocial health attitudes.

Our study integrates emerging prosocial research with sociological literatures to formulate hypotheses regarding the relationship between SES, race-ethnicity, and prosocial health attitudes and behaviors. We test these hypotheses by analyzing parent and adolescent male attitudes toward human papillomavirus (HPV) vaccination for adolescent males—a health behavior that has beneficial implications for both the vaccine recipient *and* his sex partners—and the impact of these attitudes on willingness to vaccinate. Through this analysis, our study aims to highlight the potential roles of prosocial attitudes for influencing engagement in certain health behaviors.

BACKGROUND

While a formal theory linking prosocial health attitudes, health behaviors, and health disparities has yet to be articulated, a substantial body of sociological and psychological literature suggests that (a) SES and race-ethnicity shape individuals' prosocial attitudes, and (b) prosocial attitudes, in turn, shape individuals' engagement in health behaviors that benefit others. Four related literatures offer important insights for

formulating hypotheses regarding SES and racial-ethnic differences in prosocial health attitudes and behaviors: SES and prosocial behavior, social networks, social capital, and opportunity hoarding.

SES and Prosocial Behavior

A commonsense assumption is that lower-SES individuals, given their restrictions from economic resources, educational opportunities, and social institutions and their exposure to greater interpersonal stress (Gallo et al. 2005), would prioritize their own self-interest over others' welfare (Piff et al. 2010). Consistent with this reasoning, the costs associated with prosocial behavior—which diverts attention from the self onto others—should deter lower-SES individuals from acting prosocially (Piff et al. 2010).

However, empirical research counters these assumptions and offers an alternative hypothesis. Experiments by Piff and colleagues (2010) found lower-SES people to be more generous, supporting of charity, trusting toward strangers, and helpful to distressed individuals. Despite having fewer material resources and being lower in social rank, lower-SES individuals were more likely to help increase the welfare of others, even when doing so was costly for themselves (Piff et al. 2010). These findings complement those of Kraus, Piff, and Keltner (2009) and Kraus and Keltner (2009), which suggest that lower-SES individuals are more sensitive to others in their social environments and more socially engaged in their relationships. Together, they support an alternative hypothesis: lower-SES individuals, despite possessing fewer resources, are more likely to act prosocially because they are more compassionate, egalitarian, and concerned for the welfare of others. This hypothesis alludes to the idea that while higher-SES individuals possess sufficient resources to buffer against life's disturbances, lower-SES individuals must rely more on their social bonds and are thus more socially aware of others and more prosocially oriented.

This work also resonates with research on the psychological consequences of money, which finds money brings about a state of self-sufficiency, increases social distance, and reduces helpfulness toward others (Vohs, Mead, and Goode 2008). Moreover, it complements findings concerning the economics of philanthropy that indicate that Americans with the lowest incomes give the largest percentage of their earnings to charity (Andreoni 2001).

Collectively, this research suggests that lower-SES individuals may have more positive attitudes

toward—and are more willing to engage in—prosocial health behaviors. Research has yet to directly address the role of race-ethnicity in relation to prosociality in the United States. However, given that race-ethnicity is strongly associated with resource access and social marginalization, and has impacts on health comparable to SES (Williams and Mohammed 2009), it can be hypothesized that similar patterns of prosociality among lower-SES groups may also be prevalent in marginalized racial-ethnic groups. The proceeding review of sociological literature provides further evidence to support such claims.

Social Networks

Scholarship on social networks offers insights regarding why individuals of more marginalized social positions may be more prosocially oriented while individuals of higher social positions may hold more individualistic orientations. Persons of lower (versus higher) social position tend to have narrower, more homophilous networks, (i.e., consisting of a close-knit group of individuals of similar social position), more informal ties (i.e., ties to relatives or local others that are not associated with formal organizational membership), and stronger ties to local community and kin (Blau 1974; Granovetter 1983; Horvat, Weininger, and Laureau 2003). In terms of community, these homophilous ties may be shaped by discrimination and residential segregation processes that increase the propensity that persons of lower SES or marginalized race-ethnicity will live within the same neighborhoods, thereby contributing to concentrated disadvantage within them (Williams and Mohammed 2009). Economic insecurity may force marginalized individuals to rely on network ties and help explain their strong homophilous networks (Granovetter 1983). The strong informal ties that characterize lower-SES and certain racial-ethnic group networks have been identified as a fundamental source of instrumental resources, such as loans, childcare, and basic needs—illustrating the propensity for prosocial behavior within these groups even when resources are scarce (Dominguez and Watkins 2003; Horvat et al. 2003; Stack 1974).

Social Capital

Literature on social capital may also help to explain prosociality among lower-SES and some marginalized racial-ethnic groups by providing insight into norms regarding sharing and reciprocity that emerge

from the informal relationships described in the previous section. Bourdieu (1986:248) provided one of the seminal discussions of social capital, defining it as the “aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition.” Bourdieu’s definition emphasizes that social capital consists of the quality and amount of resources that one can draw on and the social relationships that allow one to access these resources. Bourdieu also noted that social capital exchanges are generally characterized by unstipulated obligations, indeterminate timelines, and norms of reciprocity, and require some form of motivational force to occur.

Building on Bourdieu’s scholarship, Portes (1998) suggests that motivations to exchange social capital can generally be characterized as either consummatory or instrumental. *Consummatory motivations* are based on a sense of obligation to behave in a particular manner, of which a sense of bounded solidarity—whereby individuals in a common social situation learn to identify with, support, and exhibit altruism toward one another—may be particularly relevant (Portes 1998). In addition to being applicable to SES groups that may share a sense of common social position (Portes 1998), bounded solidarity may also apply to marginalized racial-ethnic groups, who often exist in tight-knit communities (Dominguez and Watkins 2003; Stack 1974). *Instrumental motivations* are based on norms of reciprocity and enforceable trust, whereby those who give expect future compensation (Portes 1998). As low-SES and some marginalized racial-ethnic groups may need to rely on their social networks to acquire basic resources, instrumental motivations may also be important for these groups (Dominguez and Watkins 2003).

Consummatory and instrumental motivations for sharing social capital have been observed in studies of the networks of low-SES, Hispanic, and black mothers. Dominguez and Watkins (2003) and Nelson (2000) identify a strong logic of reciprocity within low-SES networks that weakens when the perceived social position of the giver is higher than that of the recipient. Moreover, within low-SES African American and Latin American networks, Dominguez and Watkins observed norms of return based on trust and the assurance that those in similar social circumstances are understanding and sympathetic of daily needs. These findings suggest that prosociality among low-SES and some racial-ethnic groups may be rooted both in a sensitivity of community members’ needs (consummatory motivations) and

the expectation that prosocial behaviors will be reciprocated by community members of similar social standing (instrumental motivations).

Opportunity Hoarding

Wright's (2009) concept of *opportunity hoarding* complements social network- and social capital-based explanations regarding prosociality among lower-status individuals by informing conjectures regarding why individuals of higher social position may be less prosocially and more individualistically oriented. Drawing on Weber's (1946) seminal stratification scholarship, Wright argues that privileged social position allows individuals to gain economic advantages that disadvantage individuals excluded from accessing these positions. In regard to health, social position may enable those who are more privileged to access the best health information and resources, which negatively affects the health outcomes of more disadvantaged individuals. For example, higher-SES communities may have greater access to doctors due to a demand (and ability to pay) for their services, enabling them better access to medical technologies that are limited in supply and maintaining the flow of the latest health information within this group (Lutfey and Freese 2005). Given that more advantaged group members have greater access to knowledge and financial resources that allow them to take advantage of medical technologies, they are more likely to engage in their uptake (Phelan, Link, and Tehranifar 2010). Nevertheless, they may be more motivated by individualistic than by prosocial reasons to do so, since those persons around them are similarly privileged.

Wright's work on opportunity hoarding is complemented by Scrambler's (2001) "greedy bastards" hypothesis of health disparities, which posits that the highest-SES individuals are primarily motivated by self-interest. In analyzing widening U.K. inequalities in health, income, and wealth, Scrambler argues that capitalism encourages elite members of society to seek increased profits at the expense of the majority of the population, which creates and increases health disparities.

Converging Literatures

Collectively, these intersecting literatures provide substantial explanation for posing three conjectures about social position-based differences in prosocial attitudes and their impact on health behaviors.

First, members of lower-SES and some marginalized racial-ethnic groups may possess more positive

prosocial attitudes, and thus be more willing to engage in prosocial behavior, than their higher-SES and non-Hispanic white counterparts—even if they do not have a bond to the individuals that their behavior benefits. Second, the homophilous informal network ties that are prevalent within the networks of marginalized individuals and the norms that facilitate exchanges of social capital within these networks increase the likelihood that individuals of lower SES or marginalized race-ethnicity, despite facing a scarcity of resources, will possess greater prosocial attitudes than will higher-SES and non-Hispanic white individuals. Third, to the extent that individuals of lower SES and marginalized race-ethnicity have experienced resource scarcity and the negative impacts of opportunity hoarding, they are more likely to sympathize with similarly positioned others and possess prosocial attitudes that may motivate prosocial health behaviors.

Having formulated the underlying causal logic for why social position should contribute to prosociality, we proceed to consider the implications of such inferences for vaccination.

Prosocial Attitudes and Vaccination

Though often viewed as a personal protection against disease, vaccination against contagious diseases can be conceptualized as a prosocial health behavior because vaccinated individuals change the dynamics of disease transmission by conferring protection on unvaccinated individuals through decreased risk of disease exposure (Vietri et al. 2012). When vaccine coverage is sufficiently high, it is possible to achieve herd immunity, whereby high levels of immunity in the general population mean that even unvaccinated individuals with no direct contact with vaccinated individuals may be protected against disease. In such situations, diseases may be eradicated without vaccinating an entire population, which is particularly important for protecting individuals either who cannot be vaccinated due to compromised immune systems or for whom vaccines are ineffective. Hence, vaccines can be a greater benefit to society than to just the individual vaccine recipient because they contribute to protecting a community in which one is embedded (Quadri-Sheriff et al. 2012).

Research suggests that prosocial attitudes contribute to vaccination decisions. Altruism—a form of prosociality whereby an individual's action is intended to benefit only the recipient but not the self—has been identified as an important motivator of vaccination (Shim et al. 2012). Studies have also found that, when making vaccination decisions,

individuals are sensitive to the amount of protection conferred to others (Skea et al. 2008; Vietri et al. 2012). Moreover, a recent systematic review of studies examining the role of herd immunity in parents' vaccination decisions found that 30% to 60% of parents viewed community benefit as an important reason to vaccinate their children against various diseases (Quadri-Sherriff et al. 2012).

An important conclusion from the vaccination literature is that prosocial attitudes shape vaccination decisions. Nevertheless, a person's prosocial attitudes and behaviors are shaped by the social structures in which an individual is embedded and may thus vary by SES and race-ethnicity.

HPV Vaccination for Adolescent Males

The U.S. Advisory Committee on Immunization Practices (ACIP) recommends routine HPV vaccination for 11- and 12-year-olds and catch-up vaccination for older unvaccinated adolescents (Markowitz et al. 2014). The vaccine prevents HPV infections that cause cervical, vaginal, vulvar, anal, penile, and oropharyngeal cancers and genital warts. Most private health insurance covers the three-shot HPV vaccine series, while uninsured, underinsured, Medicaid-eligible, and American Indian and Alaska Native adolescents are eligible for no-cost HPV vaccination through the national Vaccines for Children (VFC) program (Markowitz et al. 2014). Despite ACIP recommendations and VFC coverage, as of 2014 only 42% of adolescent males and 60% of adolescent females had initiated the HPV vaccine series (Reagan-Steiner et al. 2015).

Studies have identified recommendation by a health care provider as the key correlate of vaccine acceptance and uptake among both adolescents and their parents (Gilkey et al. 2012; Holman et al. 2014; Reiter et al. 2013). Among adolescent males, greater HPV vaccine acceptability is also associated with higher perceived acceptance of HPV vaccination among peers, greater anticipated regret from contracting HPV after not being vaccinated, and the receipt of a recommendation to vaccinate from a romantic partner or close relative (Gutierrez et al. 2013; Reiter et al. 2011). Among parents, greater acceptability of HPV vaccination for adolescent sons is also associated with greater knowledge about the vaccine and HPV, greater perceived HPV vaccine efficacy, greater anticipated regret that sons would contract HPV after not being vaccinated, having a daughter vaccinated against HPV, and access to the vaccine at no cost (Donahue et al. 2014; Reiter et al. 2010, 2011).

Vaccinating males against HPV may benefit both males and their female sexual partners, who are diagnosed with the majority of HPV-attributable cancers (Markowitz et al. 2014). SES and racial-ethnic disparities in HPV-related cancers exist and are particularly well established for cervical cancer, a disease that accounts for over half of all HPV-related cancer diagnoses among women and disproportionately affects low-SES, Hispanic, and black women (Markowitz et al. 2014). Vaccinating low-SES, Hispanic, and black adolescent males against HPV may be particularly important for protecting vulnerable females because young adults tend to have sexual partners from within their communities (Jeudin et al. 2014). Hence, HPV vaccination among adolescent males is an exemplary prosocial health behavior that could be especially beneficial for low-SES as well as Hispanic and black racial-ethnic groups.

Consistent with previous research on social position and prosociality, we might expect lower-SES, Hispanic, and black adolescent males and their parents to possess more prosocial attitudes toward HPV vaccination. Examining possible SES and racial-ethnic differences in prosocial attitudes toward HPV vaccination may help illuminate the relationship between social position and prosocial health behaviors and elicit some of the nuances of social attitudes that underlie health decisions.

Hypotheses

Informed by the preceding literature, we consider whether SES and race-ethnicity are associated with parents' and adolescents' willingness to vaccinate against HPV via attitudes toward HPV vaccination as a means to: (a) prevent future sex partners, girlfriends, and wives from developing genital warts and some cancers, and (b) reduce the incidence of genital warts and some cancers in the community.

For parents of adolescent males, we test three related hypotheses that, compared to their non-Hispanic white and higher-SES counterparts, black and Hispanic and lower-SES parents will place greater importance on HPV vaccination to prevent genital warts and cancers in their sons' (a) sex partners, (b) girlfriends or wives, and (c) the community.

For adolescent males, we test two related hypotheses that black and Hispanic and lower-SES boys, compared to their non-Hispanic white and higher-SES counterparts, will place greater importance on HPV vaccination to prevent genital warts and cancers in (a) their girlfriends or wives and (b) the community.

For both parents and adolescent males, we also test hypotheses that possessing more positive prosocial attitudes toward HPV vaccination will be positively associated with willingness to vaccinate one's son or self against HPV and serve as an indirect pathway between SES and race-ethnicity and willingness to vaccinate.

DATA AND METHODS

Dataset and Sample

We tested our hypotheses using data from the University of North Carolina (UNC) HPV Immunization in Sons Study, which examined attitudes and beliefs about HPV vaccination for adolescent males (Reiter et al. 2011). Participants were (1) a national U.S. sample of parents with adolescent sons ages 11 to 17 years (response rate = 73% among parents who responded to their e-mail invitation) and (2) adolescent males ages 11 to 17 whose parents completed the survey (response rate = 56% among those whose parents responded to their e-mail invitation) (Reiter et al. 2011). Parents and adolescent males completed an English-language survey online in August and September 2010, at which point only about 2% of male adolescents had received any doses of the HPV vaccine (Reiter et al. 2010).

Parents belonged to a preexisting panel of U.S. households maintained by Knowledge Networks, a survey company that recruited a probability sample of participants for the panel using a dual frame approach (list-assisted, random-digit dialing with cell-phone-only household supplementation and address-based random sampling) (Reiter et al. 2013). For households without preexisting Internet access, the survey company provided a laptop computer and Internet access in exchange for completing multiple surveys each month (Reiter et al. 2013). Participating parents were asked to allow their 11- to 17-year-old son with the most recent birthday to participate in the study, and sons provided assent before beginning the survey. Respondents who completed the survey using existing computer and Internet access received standard incentive points from the survey panel that they could accumulate and redeem for small cash payments. Evidence suggests that the Knowledge Networks panel is generally free of common biases found in Internet survey methodology and is similar to the U.S. population on several demographic features, including race-ethnicity, education, and income (Baker et al. 2003; Dennis et al. 2009).

Our analytic sample consisted of 401 adolescent males and 518 parents of sons who were not yet vaccinated against HPV and had complete data on all variables required for our analyses (97% of valid cases for adolescent males and parents). The demographic backgrounds of responding adolescent males and parents were similar, an exception being that adolescents were more likely to be of "other" race-ethnicity and less likely to be non-Hispanic white than parents.

The UNC Institutional Review Board approved the data collection, and the University of British Columbia approved the secondary data analysis.

Measures and Variables

Details of the survey instrument design and pretesting are reported elsewhere (see Reiter et al. 2011, 2013), and parent and son survey instruments are available to view online (www.unc.edu/~ntbrewer/hpv.htm). Table 1 provides descriptive statistics for all variables.

Willingness to Vaccinate. Parents' and adolescent males' willingness to vaccinate against HPV were the dependent variables of interest. *Adolescent male willingness* to be vaccinated was derived from the question, "How willing would you be to get the HPV vaccine?" *Parent willingness* to vaccinate their sons was derived from the question, "How willing would you be to get the HPV vaccine for [son's name] if it was free?" which is consistent with current HPV vaccine accessibility for most adolescent males in the U.S. (Markowitz et al. 2014). Both items had a five-point response scale ranging from "definitely not willing" (coded as 1) to "definitely willing" (coded as 5).

Attitudes toward Vaccination. Parents' and adolescent males' attitudes toward HPV vaccination were the mediating variables of interest. Though our hypotheses relate to prosocial attitudes, we also include a variable for individualistic attitudes (assessing the importance of HPV vaccination to protect one's son or oneself against genital warts and some cancers) to test whether differences in prosocial attitudes are consistent with (or vary from) differences in individualistic attitudes toward vaccination. The survey assessed parents and adolescent males (separately) about their attitudes with respect to three foci:

1. *individualistic attitudes* ("The HPV vaccine protects guys from getting some kinds

Table 1. Descriptive Statistics for Study Variables. HPV Immunization in Sons Study, 2010.

Variable	Parents (n = 518)	Adolescent Males (n = 401)
	n (%) or M (SD)	n (%) or M (SD)
Attitudes toward HPV vaccination		
Individualistic attitudes	3.66 (1.29)	3.57 (1.29)
Prosocial girlfriend or wife attitudes	3.64 (1.29)	3.66 (1.26)
Prosocial sex partner attitudes	3.57 (1.27)	
Prosocial community attitudes	3.52 (1.29)	3.34 (1.32)
Willingness to vaccinate		
Adolescent willingness to get HPV vaccine		2.97 (1.14)
Parent willingness to get son HPV vaccine	3.38 (1.21)	
Independent variables		
<i>Parent's education</i>		
College degree+	133 (25.68)	93 (23.19)
Some college	160 (30.89)	131 (32.67)
High school diploma	158 (30.50)	127 (31.67)
<12 years	67 (12.93)	50 (12.47)
Household income (U.S. dollars)	67,457 (42,986)	65,530 (42,616)
<i>Respondent's race-ethnicity</i>		
Non-Hispanic white	355 (68.53)	251 (62.59)
Non-Hispanic black	61 (11.78)	48 (11.97)
Hispanic	76 (14.67)	61 (15.21)
Other race-ethnicity	26 (5.02)	41 (10.22)
Control variables		
Parent's religiosity	3.58 (1.35)	3.63 (1.34)
Adolescent male's age (years)	14.03 (2.11)	14.04 (2.10)
<i>Parent's age (years)</i>		
Younger than 45	313 (60.42)	
45 or older	205 (39.58)	
<i>Parent's marital status</i>		
Married or cohabitating	425 (82.05)	334 (83.29)
Single	93 (17.95)	67 (16.71)
<i>Parent's sex</i>		
Female	274 (52.90)	
Male	244 (47.10)	
<i>Number of children in household</i>		
1 or 2	371 (71.62)	282 (70.32)
3 or more	147 (28.38)	119 (29.68)
<i>Urbanicity</i>		
Urban	429 (82.82)	330 (82.29)
Rural	89 (17.18)	71 (17.71)
<i>Region</i>		
South	171 (33.01)	139 (34.66)
Midwest	131 (25.29)	102 (25.44)
Northeast	109 (21.04)	78 (19.45)
West	107 (20.66)	82 (20.45)

Note: HPV = human papillomavirus.

- of HPV that can cause genital warts and some cancers. How important is it to you that [son's name/your] getting the HPV vaccine could protect [him/you] against genital warts and maybe some cancers?"
2. *prosocial girlfriend or wife attitudes* ("A guy who gets the HPV vaccine may be less likely to pass HPV to his future girlfriend or wife. How important is it to you that [son's name/you] getting the HPV vaccine could protect [your son's/your] future girlfriend or wife against genital warts and maybe some cancers?"), and
 3. *prosocial community attitudes* ("If most people get the HPV vaccine, it may reduce the spread of HPV in communities. How important is it to you that [son's name/your] getting the HPV vaccine could reduce genital warts and some cancers in the community?"). This item corresponds to the idea of herd immunity.

In addition to these three items, the parents' survey assessed their *prosocial sex partner attitudes* ("A guy who gets the HPV vaccine may be less likely to pass HPV to his future sex partners. How important is it to you that [son's name] getting the HPV vaccine could protect his future sex partners against genital warts and maybe some cancers?"). For these questions, the five-point response scale was "not at all important" (coded as 1), "slightly important," "fairly important," "very important," and "extremely important" (coded as 5). The Pearson *r* correlations between all these variables ranged from .83 to .90 (average *r* = .85) for parents and from .72 to .80 (average *r* = .76) for adolescents. Hence, while these variables are correlated, the extent of their unshared variance enables their use for assessing distinctions between the above-mentioned focal attitudes.

Independent Variables. SES was measured using the responding parent's education and household income, modeled as separate variables. We categorized *education* as: college or university degree (the referent category), some college or university, high school diploma, and less than high school. We classified *household income* using 19 categories, ranging from <\$5,000 to \$175,000 or more. We took the midpoint of each income interval to approximate a continuous household income variable. Sensitivity analyses revealed similar results when we modeled income as a four-category scale variable.

Respondent *race-ethnicity* was coded as non-Hispanic white (hereafter "white", the referent category), non-Hispanic black (hereafter "black"), Hispanic, and non-Hispanic other or multiple races-ethnicities (hereafter "other").

Control Variables. Our analyses control for several potential confounding factors. *Parent's religiosity* is based on a single item asking parent respondents, "How important is religion to you?" The five-point response scale ranged from "not at all important" (coded as 1) to "extremely important" (coded as 5). We imputed the sample's mean religiosity score (3.6) for five participants (<1% of the total sample) who did not answer this question, the only independent or control variable for which we had missing data.

The survey assessed the *adolescent male's age* (11–17) on the date that his parent was screened for the survey, which we treated as a continuous variable. We also modeled the responding *parent's age* (younger than 45 years = 0; 45 years and older = 1), *marital status* (married or cohabitating = 0; other = 1), and *sex* (female = 0; male = 1), as well as the *number of children in the household* (1 or 2 = 0; 3 or more = 1), and *urbanicity* of their location (urban = 0; rural = 1). Last, *geographic region of residence*, the U.S. census region in which the respondent resided, is modeled categorically as South (the referent category), Midwest, Northeast, or West.

Statistical Analyses

To test our hypotheses, we used seemingly unrelated (linear) regression (UCLA 2015) to simultaneously model two sets of equations—for both parents and adolescents. Results obtained via this method and ordinary least squares regression were nearly identical.

First, we tested SES and racial-ethnic differences in HPV vaccination attitudes. For our parent sample, we specified four separate equations regressing parents' (1) individualistic, (2) prosocial son's girlfriend or wife, (3) prosocial son's sex partner, and (4) prosocial community attitudes on their household income, education, and race-ethnicity. For our adolescent male sample, we specified three separate equations regressing adolescent males' (1) individualistic, (2) prosocial girlfriend or wife, and (3) prosocial community attitudes on their household income, parent's education, and race-ethnicity.

Second, we tested the extent to which individualistic and prosocial HPV vaccination attitudes were associated with willingness to vaccinate by

first regressing willingness on income, education, and race-ethnicity, separately for parents and adolescent males, and then adding our respective attitude variables to each model.

From these two sets of results for each sample, we used the product-of-coefficients method (Preacher and Hayes 2008) to determine which SES and race-ethnicity variables had statistically significant, indirect associations with willingness to vaccinate via prosocial attitudes. Each indirect effect is the product of slope estimates observed for two indirect paths between SES or race-ethnicity, attitudes, and willingness: path a, the association between SES or racial-ethnic category and an individualistic or prosocial attitude (as detailed in step 1 above), and path b, the association between an attitude variable and willingness to vaccinate (as detailed in step 2). Then, we determined the statistical significance of each indirect effect (reported as $a*b$) using bootstrapping procedures with 500 replications to generate bias-corrected 95% confidence intervals.

We conducted our analyses using Stata/SE 13. For regression results, we report unstandardized regression coefficients (b) with p values $<.05$ as statistically significant. Parent models control for the respondent's age, gender, religiosity, and marital status as well as son's age and household-level urbanicity, region, and number of children. Adolescent male models control for the parent's religiosity and marital status, and household-level urbanicity, region, and number of children.

RESULTS

Parents and adolescents felt that potential benefits associated with HPV vaccination were fairly to somewhat important regardless of whether they were to be conferred on the adolescent, his future wife or girlfriend, his sex partner, or his community (for parents, mean = 3.52–3.66 and median = 4; for adolescents, mean = 3.34–3.66 and median = 4; Table 1). However, both parents and adolescents were generally “not sure” how willing they would be to get the vaccine for their sons or themselves (for parents, mean = 3.38 and median = 3; for adolescents, mean = 2.97 and median = 3).

Parents' Attitudes

Parents' perceived importance of HPV vaccination to protect their son against genital warts and some cancers differed by education and race-ethnicity but not income (Table 2). Parents with less than high school ($b = .45$) or a high school ($b = .32$) education (versus a college degree) and black ($b = .60$; versus

white) parents possessed more positive individualistic attitudes toward HPV vaccination.

For parental prosocial attitudes, significant associations consistent with our hypotheses existed for education and race-ethnicity but not income. For education, parents with high school diplomas ($b = .37$) or less ($b = .48$; versus a college degree) placed greater importance on HPV vaccination to benefit their son's future sex partners, while parents in each education level less than a college degree (from $b = .33$ for some college to $b = .63$ for less than high school) placed greater importance on HPV vaccination to benefit the community. For race-ethnicity, black (versus white) parents placed greater importance on HPV vaccination to benefit their son's future girlfriends or wives ($b = .52$), sex partners ($b = .64$), and communities ($b = .63$). Hispanic (versus white) parents also placed greater importance on HPV vaccination to benefit their son's future sex partners ($b = .38$).

Adolescent Males' Attitudes

For adolescent males, individualistic attitudes toward HPV vaccination differed by race-ethnicity but not SES. Black ($b = .64$) and Hispanic ($b = .67$; versus white) males reported higher individualistic vaccination importance. For the two prosocial attitude measures, we observed no SES differences, while racial-ethnic differences existed only for prosocial community attitudes. As hypothesized, black ($b = .48$) and Hispanic ($b = .46$; versus white) males had more positive prosocial community attitudes.

Parents' Willingness to Vaccinate

SES and race-ethnicity were not associated initially with parents' willingness, as shown in Table 3, Model 1. However, introducing the attitude variables in Model 2 indicated suppressor effects for black and Hispanic race-ethnicity, whereby their respective small, nonsignificant estimates in Model 1 ($b = -.01$ and $b = -.04$) were of larger magnitude and significant in Model 2 ($b = -.40$ and $b = -.24$). Of the four parent-specific vaccine attitudes in Model 2, only more positive individualistic ($b = .24$) and prosocial girlfriend or wife attitudes ($b = .27$) were associated with greater willingness to vaccinate one's son. Sex partner- and community-specific attitudes were not associated with parents' willingness, likely due to correlation with the other prosocial attitudes. Supplementary analyses that omitted other prosocial attitude variables found that sex partner- and community-specific attitudes were statistically significant predictors (data not shown).

Table 2. Association of Individualistic and Prosocial Attitudes toward Importance of HPV Vaccination with SES and Race-ethnicity. HPV Immunization in Sons Study, 2010.

Variable	Parents (n = 518)				Adolescent Males (n = 401)		
	Importance of Vaccination for . . .				Importance of Vaccination for . . .		
	Individual	Girlfriend or Wife	Sex Partner	Community	Individual	Girlfriend or Wife	Community
Income	.00 (.06)	.00 (.06)	.43 (.07)	.26 (.06)	.01 (.02)	.00 (.02)	.00 (.02)
<i>Education</i>							
College degree+	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Some college	.20 (.15)	.14 (.16)	.27 (.15)	.33* (.15)	-.04 (.19)	.32 (.19)	.04 (.19)
High school diploma	.32* (.16)	.19 (.16)	.37* (.16)	.39* (.16)	.05 (.20)	.20 (.19)	-.02 (.20)
<12 years	.45* (.20)	.35 (.20)	.48* (.20)	.63** (.20)	.36 (.25)	.45 (.25)	.28 (.26)
<i>Race-ethnicity</i>							
Non-Hispanic white	Referent	Referent	Referent	Referent	Referent	Referent	Referent
Non-Hispanic black	.60** (.18)	.52** (.18)	.64*** (.18)	.63*** (.18)	.64** (.21)	.36 (.21)	.48* (.21)
Hispanic	.32* (.16)	.21 (.16)	.38* (.16)	.23 (.16)	.67*** (.19)	.37 (.19)	.46* (.20)
Other	.37 (.25)	.46 (.25)	.38 (.24)	.39 (.25)	.28 (.21)	.28 (.21)	.28 (.22)
Intercept	3.70*** (.45)	3.82*** (.46)	3.89*** (.44)	3.62*** (.46)	2.85*** (.53)	2.16*** (.53)	2.74*** (.55)
R ²	.14	.12	.15	.13	.09	.06	.07

Note: Estimates are unstandardized slopes with standard errors in parentheses. Parent and adolescent models respectively control for all variables listed in parent and adolescent columns of Table 1. HPV = human papillomavirus; SES = socioeconomic status.
*p < .05, **p < .01, ***p < .001.

Adolescent Males’ Willingness to Vaccinate

Adolescent males’ willingness to vaccinate was positively associated with having a parent who completed some college (versus a college degree; *b* = .40) but not with income or race-ethnicity, as shown in Model 1 (Table 3). Possessing more individualistic (*b* = .16), prosocial girlfriend or wife (*b* = .18), and prosocial community attitudes (*b* = .23)—as well as having a parent with some college (*b* = .34)—were each positively associated with willingness, as shown in Model 2.

Indirect Effects of Attitudes on Willingness to Vaccinate (Mediation)

Finally, we identified reliable indirect pathways from SES or race-ethnicity to vaccination willingness via prosocial attitudes. For parents, having a

high school diploma or less (versus a college degree) was associated only indirectly with willingness to vaccinate via individualistic attitudes (indirect effect *a*b* = .08 and *a*b* = .11), and black (versus white) race-ethnicity was associated with willingness to vaccinate via individualistic (*a*b* = .14) and prosocial girlfriend or wife attitudes (*a*b* = .14). For adolescent males, Hispanic and black (versus white) race-ethnicity was associated with willingness to vaccinate via both individualistic (*a*b* = .10 and *a*b* = .11) and prosocial community attitudes (*a*b* = .11 for both groups). All reported indirect pathways (*a*b*) were statistically significant (*p* < .05).

DISCUSSION

Our study investigated SES and racial-ethnic differences in prosocial attitudes—attitudes that were

Table 3. Association of Willingness to Vaccinate with SES, Race-ethnicity, and Attitudes toward HPV Vaccination. HPV Immunization in Sons Study, 2010.

Variable	Parents (n = 518)		Adolescent Males (n = 401)	
	1	2	1	2
Income	.00 (.07)	-.00 (.41)	.00 (.04)	.01 (.15)
<i>Education</i>				
College degree+	Referent	Referent	Referent	Referent
Some college	.24 (.15)	.11 (.11)	.40* (.17)	.34* (.14)
High school diploma	.16 (.15)	-.03 (.12)	.13 (.18)	.10 (.14)
<12 years	.27 (.19)	-.01 (.15)	.28 (.22)	.08 (.18)
<i>Race-ethnicity</i>				
Non-Hispanic white	Referent	Referent	Referent	Referent
Non-Hispanic black	-.01 (.17)	-.40*** (.13)	.14 (.18)	-.14 (.15)
Hispanic	-.04 (.16)	-.24* (.12)	.23 (.17)	-.05 (.14)
Other	-.04 (.24)	-.32 (.18)	-.03 (.19)	-.19 (.15)
<i>Attitudes toward HPV vaccination</i>				
Individualistic		.24*** (.06)		.16* (.06)
Prosocial girlfriend or wife		.27*** (.07)		.18** (.06)
Prosocial sex partner		.15 (.08)		
Prosocial community		.01 (.06)		.23*** (.05)
Intercept	2.99*** (.44)	.45 (.35)	2.05*** (.47)	.57 (.39)
R ²	.10	.49	.08	.41

Note: Estimates are unstandardized slopes with standard errors in parentheses. For the parent and adolescent male samples, Model 1 results were estimated via ordinary least squares regression and Model 2 results were estimated via seemingly unrelated regression. Parent and adolescent models respectively control for all variables listed in parent and adolescent columns of Table 1. SES = socioeconomic status; HPV = human papillomavirus.

* $p < .05$, ** $p < .01$, *** $p < .001$.

associated with willingness to participate in HPV vaccination and that may impact health behaviors (Donahue et al. 2014). This prosocial focus offers potential for improving understanding of the mechanisms underlying SES and racial-ethnic disparities in health. Our analyses of U.S. national data support some of our prosocial hypotheses, which we discuss below with regard to the literatures that motivated them.

SES and Racial-ethnic Differences in Prosocial Attitudes

We predicted that lower- (versus higher-) SES and black and Hispanic (versus non-Hispanic white) parents would place greater importance on HPV vaccination to help protect their son's (a) sex partner (b) girlfriend or wife, and (c) the community and that lower-SES and black and Hispanic adolescent

males would place greater importance on HPV vaccination to help protect their (a) girlfriend or wife and (b) the community. We observed educational (but not income) differences in two of the prosocial attitudes (sex partner and community)—as well as individualistic attitudes—among parents, though no SES differences were observed for adolescent males. We also observed racial-ethnic differences in all three prosocial attitudes among parents, and in prosocial community attitudes among males, in addition to racial-ethnic differences in individualistic attitudes among both groups.

The observed educational differences in parents' prosocial attitudes may reflect numerous underlying social processes. Parents with higher education may have greater access to health care information and resources, possess greater health literacy, and be better able to take advantage of health-promoting treatments for themselves and their children (Lutfey and Freese 2005; Ross and Mirowsky 2010). However, they may also be those most likely to question scientific and medical authority and possess the agency needed to refuse vaccines on behalf of their children, which may result in individual-focused choices that undermine community health (Reich 2014). Hence, while higher-educated parents can prioritize their own child's interest when making health care decisions, lower-educated parents may be more reliant on their social bonds for health information, be more socially aware, and thus possess more prosocially oriented attitudes toward health behaviors that benefit others (Piff et al. 2010).

In contrast to education, the lack of association between income and parents' prosocial attitudes suggests that lower income does not facilitate sharing of knowledge and resources among similarly positioned others—at least for HPV vaccination. Such findings may reflect that lower-income adolescents are likely eligible for free vaccination through the VFC program (Gilkey et al. 2012) and thus less reliant on others for HPV prevention. Hence, income alone is likely insufficient for shaping parents' prosocial attitudes toward vaccination.

The racial-ethnic differences in prosocial attitudes observed for parents and sons may be explained, in part, by neighborhood segregation, concentrated disadvantage, and the strong networks that characterize some Hispanic and black communities. While socioeconomically disadvantaged whites tend to be geographically dispersed across the United States, Hispanic and black populations are disproportionately concentrated in communities with limited resource access (Williams and

Mohammed 2009). The homophilous racial-ethnic and SES profile of these communities may strengthen informal social ties, promote a sense of bounded solidarity, and encourage resource sharing (Portes 1998; Stack 1974). Hence, the observed racial-ethnic differences in prosocial attitudes may be driven by compassion toward the needs of similarly disadvantaged community members and norms and expectations that prosocial actions will be reciprocated (Dominguez and Watkins 2003; Nelson 2000). Also, disadvantaged neighborhoods are typically targets for safety-net health services, which traditionally focus on adolescent preventative care and may facilitate sharing of information about and acceptability of HPV vaccination among community members and their social networks (Tsui et al. 2013).

Furthermore, given that cervical cancer incidence and mortality rates are, respectively, highest among blacks and Hispanics (Jeudin et al. 2014), members of these racial-ethnic groups may be more likely to have been directly or indirectly affected by the disease and perceive HPV as a serious concern. In contrast, whites may be less likely to have been affected by cervical cancer and thus less likely to conceptualize HPV as a high-risk infection—an established barrier to HPV vaccine uptake (Holman et al. 2014)—or to identify with the prosocial benefits of HPV vaccination.

Differences between our findings for parents versus adolescent males may be explained by life course stage. The lack of SES disparities in adolescent males' prosocial attitudes may be due to regular interactions with peers of varying SES in school and social settings, whose norms and values may contradict those of their families and moderate the effect of familial SES (Cockerham 2013; Umberson, Crosnoe, and Reczek 2000). This effect may be especially relevant within socioeconomically disadvantaged communities where various competing and contradictory cultural frames and scripts—including those around sexual behavior—exist that may impact adolescents' attitudes and behaviors (Harding 2007). Regarding the lack of racial-ethnic differences in sons' attitudes toward girlfriends or wives, despite black and Hispanic adolescents being more likely to exist in communities that encourage adherence to prosocial community norms, these adolescents may never have had a serious girlfriend and are unlikely to be thinking about their future spouse. Hence, in contrast to community members, girlfriends or future spouses may not resonate as strongly with adolescents as figures who will benefit from their actions.

Prosocial Attitudes and Willingness to Vaccinate

We predicted that the possession of more positive prosocial attitudes toward HPV vaccination would be positively associated with willingness to vaccinate one's son or oneself. For parents, despite the multiple associations found between (low) education and black and Hispanic race-ethnicity and all three prosocial attitudes, only prosocial girlfriend or wife attitudes were associated with willingness to vaccinate one's son—and this was only a significant indirect pathway for blacks. For adolescent males, we observed positive associations between both prosocial girlfriend or wife and prosocial community attitudes and willingness to be vaccinated, while only prosocial community attitudes served as an indirect pathway between Hispanic and black race-ethnicity and willingness. Individualistic attitudes were also positively associated with willingness to vaccinate for both parents and adolescent males and were a significant indirect pathway between (a) lower education and black race-ethnicity among parents and (b) Hispanic and black race-ethnicity among adolescent males.

Attitudes shape intentions, which may affect behaviors (Bohner and Dickel 2011). Our findings suggest that when parents make health decisions for their children, prosocial attitudes may be overshadowed by individualistic concerns for their own child's (or in the case of a future girlfriend or wife, a potential future family member's) well-being. This finding is consistent with research that finds, though some parents recognize the importance of herd immunity, parents' vaccination decisions are primarily driven by the benefits conferred to their own child (Quadri-Sheriff et al. 2012). Hence, despite the educational and racial-ethnic patterns we observed across parents' prosocial attitudes, these attitudes alone are likely insufficient for motivating parents' willingness to have their child participate in a health intervention.

Our findings for adolescent males, however, suggest that in addition to individualistic considerations, the community benefits of prosocial health behaviors may be salient for motivating their willingness to participate. This finding echoes results of previous studies demonstrating that when making vaccination decisions for oneself, an individual takes into account the amount of good he or she can do for others and is not solely driven by self-interest (Shim et al. 2012; Vietri et al. 2012).

Also of note are educational and racial-ethnic disparities in willingness to vaccinate (Table 3),

which suggest that other, unexplained pathways are not captured by our attitude measures. Adolescents whose parents had some college education (versus a college degree) reported greater willingness to vaccinate, even after controlling for attitudes. This finding may be driven by highly educated parents who may have been more likely to be anti-vaccine (Reich 2014)—and who potentially shared negative vaccination viewpoints with their children. It is also consistent with research demonstrating that parents with college degrees are less willing to vaccinate their children against HPV (Jeudin et al. 2014). Additionally, when controlling for attitudes, black and Hispanic parents are less willing to vaccinate their sons than non-Hispanic whites. Barriers, including a lack of information and concerns that the vaccine may be experimental, be unsafe, or have long-term side effects—similar to the barriers identified by black and Hispanic parents shortly after HPV vaccines were approved for females—may explain this initial lack of willingness to vaccinate sons (Jeudin et al. 2014). However, surveillance data indicate these barriers have not resulted in lower HPV vaccine initiation among these racial-ethnic groups (Curtis et al. 2014).

In terms of informing health-promoting initiatives that target adolescent health behaviors—a time when individuals and their parents may both play a role in health decision making (Umberson et al. 2000)—our findings suggest that emphasizing the individual benefits that an intervention can confer is key for motivating adolescents' willingness to participate, while communicating the prosocial benefits of interventions may also be helpful. Emphasizing prosocial benefits may be particularly useful for black and Hispanic adolescents, as such a strategy may capitalize on community-focused norms (Dominguez and Watkins 2003) and help mitigate the negative health disparities typically observed within these groups (Williams and Mohammed 2009).

Implications for Future Research

Our study has important implications for medical sociology and public health in terms of studying and addressing health disparities. First, it draws attention to the need to consider prosocial attitudes and vaccination as sociological phenomena. Our finding that (among parents) SES and (among parents and adolescent males) race-ethnicity influenced willingness to vaccinate via both individualistic and prosocial attitudes illustrates a classic sociological focus: the interplay between the self and society (or

community) (e.g., Durkheim [1893] 2014; Simmel 1950). An individual can be self- or child-interested and (a) also possess prosocial concern that motivates him or her to behave in a way that benefits others or (b) lack prosocial concern yet still undertake actions that have positive spillover effects for others. Thus, in considering prosocial attitudes and vaccination as sociological phenomena, our research demonstrates the utility of the prosocial attitudes concept for medical sociology, particularly for understanding the role of SES- and racial-ethnic-based attitudes for shaping willingness to participate in health behaviors that pose a collective health benefit.

Second, our study has relevance for informing health disparities research. Well-documented SES and racial-ethnic disparities exist in the uptake of numerous medical innovations (Phelan et al. 2010). While prosocial attitudes might be helpful for motivating certain health behaviors, in many cases they may be insufficient for reducing health disparities due to limited knowledge about an innovation (including its individual and prosocial benefits), inadequate material resources, or a lack of willingness to adopt a particular treatment. Hence, prosocial attitudes may act as a countervailing mechanism for understanding health disparities—that is, a mechanism that is counter to and cumulatively smaller than other effects that collectively contribute to observed relationships between SES, race-ethnicity, and health (Lutfey and Freese 2005). From a policy perspective, interventions solely targeting community attitudes may be limited in communities where socioeconomic resources are scarce.

In the United States, SES and racial-ethnic disparities in HPV vaccination vary across stages of uptake (Polonijo and Carpiano 2013). *Initiation* of the vaccine series is higher among lower- (versus higher-) SES and black and Hispanic (versus non-Hispanic white) adolescents (Curtis et al. 2014). However, vaccine series *completion* for adolescent girls increases with SES and is lower among blacks yet higher among Hispanics (versus non-Hispanic whites; Curtis et al. 2014). The reverse disparities identified in initiation may reflect the relative success of the VFC program and HPV vaccine accessibility at safety-net clinics in underserved areas (Tsui et al. 2013) as structural-level interventions that have weakened the association between social position and the uptake of a new health-promoting technology. A recent study also found that black and Hispanic adolescent males with private and Medicaid insurance are more likely than

non-Hispanic whites to initiate HPV vaccination both at their first eligible visit with a health care provider and overall (Agawu et al. 2015). When considered with respect to our findings, this study suggests more favorable patterns of vaccine acceptance within these groups. However, unequal vaccine series completion among lower-SES and black adolescents may reflect the persistence of additional barriers (e.g., lack of awareness that three vaccine doses are needed or lack of flexible work hours to schedule doctor appointments) that trump the potential of prosocial attitudes to reduce overall levels of HPV-related cancers in vulnerable communities.

Limitations and Strengths

This study tested theoretically motivated *a priori* hypotheses by analyzing data from a unique national survey focused on parental and adolescent male attitudes toward HPV vaccination. Nonetheless, some limitations must be noted.

Given the cross-sectional survey design, we could not establish causal relationships. We were also limited by the time of survey administration—only six months after the permissive approval of HPV vaccination for males, when knowledge about and uptake of the HPV vaccine for boys was low (Reiter et al. 2013). Ideally, we would test how attitudinal differences relate not only to willingness to vaccinate but also to vaccine uptake, and we encourage future studies to consider this relationship.

Though this data had a unique range of variables that were useful for testing our conjectures, it did not include more in-depth SES- and race-ethnicity-related factors, such as language proficiency, immigration status, duration of time in the United States, cultural norms, and community ties—factors that may be relevant for shaping one's social capital, social networks, and ultimately, prosocial attitudes and behaviors. Moreover, our sample limited our ability to investigate how SES *and* race-ethnicity may interact to shape prosocial attitudes and behaviors. Future research should consider these factors.

Nevertheless, our study makes a novel contribution to the literature and explores a relatively understudied area for future expansion in medical sociology: vaccination. Moreover, unlike much prior health disparities research, which focuses primarily on the deficits experienced by disadvantaged groups as explanations for health inequalities, our study suggests potential social strengths that may encourage health-promoting behaviors among these groups.

CONCLUSION

Health disparities constitute significant and challenging public health problems. Our study highlights how lower education and marginalized racial-ethnic status may shape willingness to participate in health behaviors via prosocial attitudes. In light of our findings, we suggest that prosocial attitudes toward one's community may be a particularly salient motivator of willingness to participate in vaccination, while acknowledging that structural limitations may prevent some parents and adolescents from acting in accordance with such attitudes. Considering the role of prosocial attitudes as a motivational tool may offer a useful strategy for public health interventions and other efforts aimed at encouraging participation in activities that benefit the well-being of others (e.g., volunteering, donating) and even oneself (Thoits and Hewitt 2001). Moreover, prosocial attitudes may be relevant for medical sociologists looking to understand personal, family, and community mechanisms underlying health disparities, including health spillovers, the uptake or adoption of health-promoting treatments, and the disease risks that such treatments may prevent throughout the life course.

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