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Untangling the associations among distrust, race, and neighborhood social environment: A social disorganization perspective

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Abstract

Over the past decade, interest in exploring how health care system distrust is associated with individual health outcomes and behaviors has grown substantially, and the racial difference in distrust has been well documented, with African Americans demonstrating higher distrust than whites. However, relatively little is known about whether the individual-level determinants of distrust differ by various dimensions of distrust, and even less is understood regarding whether the race-distrust association could be moderated by the neighborhood social environment. This study used a dual-dimensional distrust scale (values and competence distrust), and applied social disorganization theory to address these gaps. We combined the 2008 Philadelphia Health Management Corporation's household survey (N=3,746 adult respondents, 51% of which are of African American race) with neighborhood-level data (N= 45 neighborhoods) maintained by the 2000 US Census and the Philadelphia Police Department. Using multilevel modeling, we found that first, after controlling for individual- and neighborhood-level covariates, African American residents have greater values distrust than whites, but no racial difference was found in competence distrust; second, competence distrust is more likely to be determined by personal health status and access to health care services than is values distrust; and third, *ceteris paribus*, the association between race and values distrust was weakened by the increasing level of neighborhood stability. These results not only indicate that different aspects of distrust may be determined via different mechanisms, but also suggest that establishing a stable neighborhood may ameliorate the level of distrust in the health care system among African Americans. As distrust has been identified as a barrier to medical research, the insight provided by this study can be applied to develop a health care system that is trusted, which will, in turn, improve population health.

Keywords

health care system; distrust; neighborhood social environment; multilevel modeling; Philadelphia

Introduction

Over the past decade, interest in health care system distrust has grown substantially. According to Armstrong et al. (2008), this increased interest in distrust is due to the recognition that distrust can inhibit the functioning of most elements of society. Trust in the health care system is central to the quality of interactions between patients and providers (Mohseni & Lindstrom, 2007), and plays an integral role in the care process (LaVeist et al., 2009). In addition, a growing body of evidence suggests that distrust may contribute to problems with health and health care (Armstrong et al., 2006; Yang, Matthews & Hillemeier, 2011; Yang, Matthews & Shoff, 2011).

Defining trust and distrust is complex. The key difference between distrust and “no trust” is that distrust implies negative beliefs that the trustee will go against the person’s best interest (Hall et al., 2001). The other distinction that needs to be established is that having distrust in an individual person (e.g., physician) is not the same as having distrust in the health care system as a whole (Hall et al., 2001). Although many studies have focused on distrust in personal health providers (Hall, 2006), less attention has been paid to distrust in the health care system (Rose et al., 2004). It should also be noted that just because an individual has distrust in the health care system, this does not mean that s/he will have distrust in their physician (Cunningham et al., 2007). This paradox has been discussed elsewhere (Hall et al., 2001). Many studies (including this one) focus on distrust rather than lack of trust, because distrust refers to a step beyond lack of trust, and this additional step may be crucial for understanding racial disparities (Armstrong et al., 2008; Corbie-Smith et al., 2002; Durant et al., 2011; Wasserman et al., 2007).

Due to the fact that distrust is an important contributor to racial disparities in health and health care (Armstrong et al., 2008; Armstrong et al., 2006), this study will focus on racial differences in health care system distrust (hereafter distrust) and whether neighborhood social environment plays a role in understanding the association between race and distrust. Historically, in the US, the racial disparity in distrust can be attributed to the medical scandals where African Americans were the major victims. Historic events, such as the Tuskegee Syphilis Study, seriously challenged the faith by which African Americans live (Gamble, 1997), and inspired this study to concentrate on the gap in distrust between African Americans and whites. Most of the previous studies on distrust emphasized how individual characteristics contribute to distrust, and underestimated, if not ignored, the importance of the environment in which people live. Building upon the existing literature, this study will advance the knowledge of distrust in the health care system by incorporating neighborhood social environment into the analysis and investigate whether individual characteristics and environment are jointly associated with distrust.

Dimensions of distrust

Prior health care research has provided evidence that the individual’s distrust in primary health care providers is multi-dimensional (Hall et al., 2001), including factors such as fidelity, confidentiality, and honesty. Many existing scales of distrust in primary health care providers have been criticized for being heavily focused on interpersonal distrust (Hall, 2006) and overlooking other forms of distrust related to the health care system as a whole (Shea et al., 2008). While several studies have attempted to develop new scales to fill this gap (Balkrishnan et al., 2003; Hall, 2006), these instruments can only be applied to specific institutions, such as insurers or hospitals, and provide limited implications for the overall health care system (Shea et al., 2008). Rose and colleagues (2004) first offered a unidimensional scale of overall health care system distrust, but this scale has been found to have relatively low reliability and to be correlated with other scales of primary provider distrust.

In light of these shortcomings, the same research team expanded the unidimensional scale into a dual-dimensional health care system distrust scale (Shea et al., 2008) based on the model proposed by Hovland et al. (1953). While the reliability and validity of this new instrument are greatly improved, the dual-dimensional scale still has some drawbacks. First, when testing the scale, the developers did not account for other important correlates, e.g., insurance status. Second, distrust should be distinguished from dissatisfaction, but the researchers did not explicitly address this issue. Finally, a dual-dimensional scale may not adequately capture the whole concept of health care system distrust. Other aspects of distrust may be overlooked, such as policy-making, transparency, and maintaining patient's privacy.

Despite these drawbacks, we found this dual-dimensional distrust scale to be the best available instrument in the literature, because the ultimate goal of developing this dual-dimensional scale is to help identify the role that distrust plays in racial health disparities, which corresponds to the focus of this study. Therefore, keeping the above-mentioned caveats in mind, we employ the scale that covers two primary aspects of health care system distrust: values and competence (Shea et al., 2008). Generally, the former refers to the values that are thought to be necessary in the health care system, such as respect, honesty, caring, dependability, and confidentiality, while the latter represents the technical skills needed for successful health care (Armstrong et al., 2008). Extending from these definitions, values distrust is the perception that the health care system does not keep those values (Shea et al., 2008). On the other hand, competence distrust refers to making mistakes in technical skills, such as errors in judgment or errors in execution (Hall et al., 2001), and the perception that the entity is incapable of doing what is needed and correct (Shea et al., 2008). Views of competence are influenced by evaluating communication skills, bedside manner, gathering accurate medical histories, and providing information for effective treatment (Hall et al., 2001).

Determinants of distrust

The literature has documented the racial difference in distrust (Armstrong et al., 2008), but relatively little research has focused on exploring the determinants of this disparity at both the individual- and neighborhood-levels. Therefore, the existing evidence for the determinants of trust in personal health care providers may offer some guidance. As the focus of this paper is on the relationship between race and distrust, we will elaborate on the effect of race on distrust and discuss other potential factors that may explain distrust in the health care system.

The level of distrust among those of African American race is higher than that of white individuals (Braunstein et al., 2008; Corbie-Smith et al., 2002; LaVeist et al., 2000; Rajakumar et al., 2009; Rose et al., 2004). High distrust and racial differences are prevalent in all aspects of the health care system. For example, two studies in Maryland, U.S.A., concluded that compared to their white counterparts, patients who are African American perceived more racism, reported more medical distrust, had more concerns about privacy and experimentation, and in turn, were less satisfied with health care quality (Boulware et al., 2003; LaVeist et al., 2000). A stronger and more recent piece of evidence was from the Boston metropolitan area (U.S.A) where no racial difference in "interpersonal distrust" was found. Despite the fact that interpersonal distrust did not vary by race, individuals who report African American race were more aware of the risk of being "used as guinea pigs" without consenting and tended to think that health care providers prescribed medications as a way of "experimenting on people without permission" compared to white respondents (Durant et al., 2011). The awareness of victimization by medical systems is a source of values distrust; more importantly, the racial difference in the awareness further suggests a racial disparity in health care system distrust.

The racial difference in distrust is not unique between the African American and white population. It has been found that patients of African American, Hispanic, Native American, Asian, and Pacific Islander races/ethnicities were more likely than white patients to question physicians' behaviors such as providing referrals to specialists, performing unnecessary tests, and making medical decisions based on the types of patients' insurance (Stepanikova et al., 2006). As Durant et al. (2011) suggested, high distrust among minorities in their primary health care providers may increase their distrust in other social institutions or services, including the health care system, and in turn, hinder population health (Armstrong et al., 2006). For example, elevating health care system distrust has been reported to deteriorate overall population health by decreasing the use of preventive health care services (Yang, Matthews & Hillemeier, 2011). Similarly, high distrust among individuals who are African American could be translated into high distrust in medical research on children. Parents who are African American were twice more likely than white parents to believe that physicians would not make full disclosure about their children's participation and that participants in medical studies would be favored and receive quality care (Rajakumar et al., 2009).

In addition to race, several factors are found to be associated with distrust, including education, access to health care services, and age, among other individual characteristics. Armstrong and colleagues (2006) found that distrust in the health care system was more prevalent and more strongly associated with health status than low trust in personal physicians. In a later study, Armstrong et al. (2008) found higher values distrust among respondents who are of African American race compared to white respondents, even after taking into account sociodemographic characteristics, health status, and other health care factors. A significant race effect was not identified for competence distrust (Armstrong et al., 2008). Armstrong et al. (2008) also identified higher values distrust among younger individuals and among individuals with higher household incomes.

Carpenter and colleagues (2009) have pinpointed the importance of access to health care services in the development of trust. Specifically, trust was found to be higher among men who had a regular source of care compared to those who did not visit the same health care provider. Also, patients with trust in their physicians are less likely to report having unmet health care needs (Mollborn et al., 2005). Halbert et al. (2006) found that low trust was associated with fewer interactions with health care providers and not receiving medical care at a physician's office.

The literature above conveys three important messages. First, individual characteristics, particularly race, education, and age, are crucial to understanding the variation of trust/distrust. Second, the conceptual complexity of distrust suggests that the determinants of distrust may differ by dimensions. Third, previous research has ignored the importance of the environment where people live when investigating what contributes to individual's distrust in the health care system. In light of these findings, this study will fill this gap by exploring whether individual characteristics and neighborhood social environment are jointly associated with distrust.

Explanations for greater distrust among African Americans

As previously discussed, American history has entailed several medical scandals that lead us to believe that African Americans have higher distrust than whites. More evidence to support our argument is provided here. The Tuskegee Syphilis Study is frequently cited as the reason for African American individuals' distrust in the health care system (Gamble, 1997). The Tuskegee Syphilis Study is the 40-year (1932 to 1972) governmental study in which approximately 400 men who were African American were deliberately denied effective treatment for syphilis (Gamble, 1997). The legacy of this study has come to

symbolize racism in medicine and governmental abuse of citizens who are African American (Gamble, 1997). Previous studies have described Tuskegee as the singular reason behind African Americans' distrust in the health care system; however, these studies fail to consider that distrust in medicine by African Americans predated the Tuskegee study (Gamble, 1997; Scharff et al., 2010). It has been argued that distrust in the health care system by African Americans stems from centuries of maltreatment and racial discrimination (Gamble, 1997; Scharff et al., 2010).

Differential treatment in medicine on the part of individuals who are African American started during the period of slavery and continued well throughout the 20th century. During this time, the scientific view that people who were African American were biologically different from people who were white was widespread (Wasserman et al., 2007). During the antebellum period, both people who were slaves and free African Americans were used as subjects for medical experimentation without their consent or personal benefit (Dula, 1994; Gamble, 1997). After the Civil War, a grave robbing ring provided bodies for the medical schools in Philadelphia by taking bodies from a cemetery that contained bodies of African Americans (Gamble, 1997). This scientific view of biological differences between people who were African American and white race set the stage for discrimination against African American individuals in the medical system, including insufficient medical treatment, segregated health care facilities, few universities that accepted medical students who were African American, discriminatory medical licensing, and limited job opportunities for doctors who were African American (Wasserman et al., 2007). How these historical events have been discussed and portrayed in the popular and academic media (Dula, 1994; Wasserman et al., 2007) and how these lingering effects persist decades after human subjects protections have been implemented (Baker, 1999) both contribute to the higher level of distrust in the health care system among those of African American race.

In more recent years, the beliefs that AIDS is a government-induced genocide against African Americans, and that the government promotes substance abuse as a way of keeping African Americans in poverty and in prison have also been suggested as reasons for higher distrust among African Americans (El-Sadr & Capps, 1992; Gamble, 1997; Wasserman et al., 2007). In the 1990s, some academic institutions were still conducting studies on African Americans that were in violation of several human subjects protection guidelines (Scharff et al., 2010). Distrust in the health care system among those who are African American may not only be the result of their knowledge of historical forms of racism, but may also be due to their personal experiences with racism (LaVeist et al., 2000; Musa et al., 2009). Racial discrimination toward individuals whose race is African American has been well-documented in medical research and clinical settings (Boulware et al., 2003). Also, those who are of African American race differ from those who are white in their views about how race or ethnic background affects how they are treated by the health care system (Lillie-Blanton et al., 2000).

Even today, people who are African American are, at times, treated differently in the health care system solely because of their race, and this differential treatment contributes to continued distrust (Gamble, 1997). Perceptions of general discrimination and perceived discrimination in medical care is higher among individuals whose race is African American compared to white individuals (Kandula et al., 2009). Lillie-Blanton et al. (2000), using a nationally representative survey of perceptions of race and the health care system, found that respondents who are African American are considerably more likely (14 percent) to report that they have been treated unfairly by the medical system because of their race or ethnicity when compared to white respondents (1 percent). Also, nearly two-thirds of African Americans report that they are concerned that they will be treated unfairly by the health care system in the future (Lillie-Blanton et al., 2000). In fact, people who are African American

are more likely (21 percent) than white people to believe that a study similar to Tuskegee could occur today (Brandon et al., 2005).

Distrust in the health care system continues today partially due to the lack of understanding about the changes that have been made in institutionalizing medicine and medical ethics (Wasserman et al., 2007). Because past experiences influence a person's level of trust, a patient who has experienced discrimination or racism in the past would be less willing to have trust in the health care system (King, 2003). In addition, if a person has distrust because of an encounter with a specific area of health care, this can lead to a more broad distrust in the health care system (LaVeist et al., 2009).

Why neighborhood social environment may affect distrust—The explanations discussed above for African Americans' tendency to have greater distrust in the health care system also suggest that African Americans' commonly distrust the government and other institutions in society. Blendon (2007) proposed that Americans evaluate their distrust in institutions (e.g., Congress and health care system) based on the overall perception of the environment in which they live. For instance, high crime or unemployment rates can be regarded as an indicator of government failure and can contribute to the development of distrust in a wide range of social institutions, including the health care system (Blendon, 2007). Following on from this institutional performance model argument, and in order to fully explore the determinants of distrust, we turn our focus to the neighborhood social environment.

Neighborhood effects on human and social outcomes have been discussed in past literature (Berkman & Kawachi, 2000; Mays et al., 2007). For instance, social disorganization theory suggests that if a neighborhood is socially disorganized it will produce and experience more crime (Pattillo-McCoy, 1999) and that residential stability permits growth of social ties and local attachment (Taylor, 1996). When neighborhoods are occupied by residents who are predominantly poor and of a racial/ethnic minority, these social spaces are concentrated with social problems (Mays et al., 2007). Common characteristics of these poor neighborhoods with a higher concentration of residents who are African American include high rates of violence and higher levels of disadvantage and residential turnover (Peterson & Krivo, 2009). Residents of neighborhoods with high rates of crime and violence feel more vulnerable and threatened (Massey, 2001) and are more likely to be exposed to stressful life events (Fang et al., 1998). Neighborhood disadvantage is associated with a higher incidence of social strain, which occurs from residents witnessing negative behaviors and engaging in negative social interactions (Schulz, Israel, Williams et al., 2000; Schulz, Williams, Israel et al., 2000). Individuals who live in social environments that are continually threatened are more likely to develop a sense of distrust and fear of others (Adler & Ostrove, 1999).

Neighborhoods with concentrated poverty have higher rates of exposure to crime and violence, higher unemployment rates, substandard housing and schools, and lack of green space, all of which creates a social environment with less social connectedness and fewer social benefits for residents (Mays et al., 2007). These social environment factors have been found to be associated with distrust and, in turn, affect personal health (Yang, Matthews & Shoff, 2011).

Using a sample of men who were of African American race, Hammond (2010) found that medical distrust was the highest for those who reported more frequently experiencing racial discrimination in their social environment. This finding shows support for how everyday discrimination experiences may extend to African American's distrust in the health care system (Hammond, 2010) and why it is important to take social environment factors into account.

Consequences of distrust

Distrust in the healthcare system has consequences for use of preventive services (O'Malley et al., 2004; Yang, Matthews & Hillemeier, 2011). When a person has trust in their health care provider, she or he is more likely to seek medical care, comply with treatment recommendations, and return for follow-up care (Thom et al., 2004). When patients delay seeking care due to distrust, the care process can become complicated, causing worse patient outcomes (LaVeist et al., 2009). In addition, beginning care in the later stages of disease progression can increase the cost of the medical treatment (LaVeist et al., 2009).

In their study of HIV-positive individuals from the American Deep South, Whetten et al. (2006) found that distrust is associated with more emergency room visits, a decreased likelihood of taking medications, and worse mental and physical health. Braunstein et al. (2008) established that trust in medical researchers is a strong predictor of willingness to participate and that participants who are African American were significantly less likely to participate in cardiovascular prevention trials compared to white participants.

African American's greater distrust in the health care system puts them at a greater risk for negative health outcomes (Musa et al., 2009). Trust in the health care system can increase access to services, improve health outcomes (Thom et al., 2004), and may contribute to the elimination of health care disparities (Musa et al., 2009).

Hypotheses—In light of the findings from past distrust and trust studies and following social disorganization theory and the institutional performance model, we hypothesize that neighborhood social environment will moderate the association between race and distrust. The following hypotheses are tested in this paper:

- (H1) Race is associated with distrust, even after controlling for all individual-level covariates, with individuals of African American race having greater distrust than whites;
- (H2) after considering neighborhood social environment covariates, race continues to be associated with distrust;
- (H3) the neighborhood social environment is directly associated with distrust, where
 - (H3a) neighborhood stability and social affluence are negatively associated with distrust and
 - (H3b) neighborhood disadvantage and high crime rates are positively associated with distrust.
- (H4) The neighborhood social environment moderates the relationship between race and distrust. We hypothesize that the association between race and distrust to be
 - (H4a) reduced by neighborhood stability and social affluence and
 - (H4b) enhanced by neighborhood disadvantage and high crime rates.

Data and Methodology

Data Source

The Philadelphia Health Management Corporation's (PHMC) 2008 Household Health Survey was used to create all individual-level measures. The PHMC administers a biannual telephone household survey that collects information on health behavior and health care in a 5-county area in southeast Pennsylvania, U.S.A. (PHMC, 2008). To ensure representation within metropolitan Philadelphia, a stratified sample that included a cellular sampling frame was used. PHMC utilized a random-digit dialing methodology to conduct interviews during

June through October 2008. There were 4,394 total respondents who lived in Philadelphia County (the study area of this research), of whom 300 completed the survey via cell phone. The Telcordia terminating point master data file was used to obtain the cell phone sample. PHMC has identified that the cell phone only respondents are different from other phone user types in terms of age, race/ethnicity, gender, poverty status, and access to health care services. In light of these differences, PHMC constructed the sample weights to account for the differences in respondents' age, gender, income, race/ethnicity, and phone type. The PHMC 2008 response rate was 25 percent (using the American Association for Public Opinion Research response rate criterion 3); however, the PHMC sample closely resembles the demographic and socioeconomic structure of the American Community Survey 2006–2008 3-year estimates and mirrors the 2008 Behavioral Risk Factor Surveillance Survey. By applying the survey weight to our analyses, we were able to adjust for sampling bias due to non-response and differences in cell vs. landline respondents (PHMC, 2008).

This study is based on the 3,746 adult respondents who reported their race as African American (N=1,897) or white (N=1,849) out of the total 4,394 adult respondents living in Philadelphia County. The difference between these two sample sizes is the result of excluding individuals who did not report their race as African American or white. These respondents include 357 Hispanics and 200 respondents of other races. As this study focuses on the white-black gap in distrust, these minority groups were excluded from the analyses.

The neighborhood-level data come from 2000 Census summary files for tracts and from the Philadelphia Police Department (Uniform Crime Reports, 2000; US Census Bureau, 2000). Since the 1980s, Philadelphia County has been divided into 45 neighborhoods that are recognized as such by residents according to boundaries identified by local planners and city officials (PHMC, 2008). The neighborhood-level measures used in these analyses were created by aggregating census tract-level data according to the previously defined 45 Philadelphia neighborhood boundaries. The neighborhood boundaries were developed by local community planners, officials, and organizers (PHMC, 2008).

Measures

Individual-level—There are two dependent variables used in this analysis, *values distrust* and *competence distrust*, that were derived from a 9-item health care system distrust scale developed by Shea et al. (2008). The reliability and validity of this scale has been previously tested and reported (Shea et al., 2008) and this scale has been used in previous studies (Yang, Matthews & Hillemeier, 2011; Yang, Matthews & Shoff, 2011). Following Shea et al. (2008), factor analysis with the Varimax rotation method was used to divide distrust into two subscales that capture different dimensions of distrust: *values distrust* and *competence distrust*. These two factor scores were generated using regression methods. The factor loadings for each of the dimensions of distrust are reported in Table 1 under their respective components of distrust and these factors echoed those reported in the original paper (Shea et al., 2008). Responses to these 9-item questions were answered on a 5-item Likert scale ranging from “strongly agree” to “strongly disagree.” Each of these 9-items loaded on only one dimension of distrust. The eigenvalues for competence and values distrust were 1.16 and 3.56, respectively, and the total variance explained was 52 percent, which is similar to Shea et al. (2008). While missing data on any one survey question were rare, we imputed missing values based on an EM algorithm for continuous variables (Hill, 1997). Imputed scores were rounded to the nearest whole number to reflect the Likert scales.

This analysis includes four categories of independent variables: Demographics, Socioeconomic Status (SES), Health Status, and Access to Health Services. All variables were self-reported. Race is the main independent variable of interest. Because the percentage of Hispanics (8 percent) and respondents of other races (7 percent) is low in the

PHMC data, and because the focus of this study is on differences in distrust between African Americans and whites, the analysis is restricted to those respondents who are African American and white only. The demographic variables include measures of race, sex, age, and marital status. *African American* and *male*, are dichotomous variables and *age* was treated as a continuous variable. Marital status was categorized into three groups: *married or cohabiting*; *widowed, divorced, or separated*; and *single*, which is the reference category.

Variables that capture SES include measures of employment status, poverty, and educational attainment. *Employed* is a dichotomous variable used to compare those who are employed to those who are unemployed, disabled, or retired. *Poverty* is a dichotomous variable for those who are living in households with incomes below the poverty line. Poverty status was determined according to the 2008 federal poverty guidelines. Five dichotomous variables were created to measure educational attainment: *less than high school* (reference group), *high school graduate*, *some college*, *college*, and *post-college degree*.

The measures of health status include the *number of health conditions* and the *level of stress*, both of which are measured as continuous variables, with the former measuring the number of physical health conditions the respondent reported and the latter measuring how much stress the respondent reported experiencing during the past year ranging from 1 (no stress) to 10 (extreme stress). The access to health services variables include the dichotomous measures *insured* (those covered by health insurance, either public or private), *regular source of care* (respondents who answer ‘yes’ to “Is there one person or place you usually go to when you are sick or want advice about your health?”), and *transportation problem* (respondents who answer ‘yes’ to “In the past year have you canceled a doctor’s appointment or not scheduled one when you needed it because of transportation problems?”).

The descriptive statistics are displayed in Table 2 for the total sample and for those respondents of African American and white race separately. The sample was split almost evenly by race, with African American respondents comprising 51 percent of the sample. Approximately one third of the sample was male and the mean age was 52 years. Fifty-seven percent of the sample was currently employed, and 13 percent of the respondents lived in a household below the poverty level. The majority of respondents was insured and had a regular source of care. Only twelve percent of the sample reported having difficulty finding transportation to medical appointments.

Neighborhood-level—Tract-level data were aggregated to Philadelphia neighborhoods to create five measures of neighborhood social environment: *residential stability*, *neighborhood disadvantage*, *social affluence*, *violent crime rate*, and *property crime rate*. Following Sampson and colleagues (Morenoff & Sampson, 1997; Sampson et al., 1997) and other studies (Boardman, 2004; Yang, Matthews & Shoff, 2011), *residential stability* was derived from two Census 2000 variables: the percentage of house owners and the percentage of residents living at the same address over 5 years. The correlation between these two census variables was high ($r=0.71$; $p<0.01$); therefore, the variables were standardized and averaged to yield one single indicator of residential stability. Neighborhood disadvantage and social affluence were two factor scores that were derived from eight census variables. Three variables loaded onto *social affluence*: percentage of residents ages 25 or over with a bachelor’s degree or higher (factor loading: 0.96), percentage of the civilian population ages 16 years or over employed in professional or managerial occupations (0.96), and the percentage of the population with annual incomes over \$75,000 (0.66). The second factor, *neighborhood disadvantage*, includes the percentage of households with a resident/room ratio greater than 1 (0.77), percentage of female-headed households (0.85), the unemployment rate (0.94), poverty rate (0.96), and the percentage of people receiving public

assistance (0.89). These two factors accounted for over 90 percent of the total variance among the eight census variables.

Tract-level crime data from the Philadelphia Police Department was aggregated to the neighborhood-level and converted to rates (per 1,000 population). The *violent crime rate* includes robberies and aggravated assaults, while the *property crime rate* includes residential and commercial burglaries, arson, theft, and auto theft. As shown in Table 2, the average rate of violent crimes in a neighborhood was 13 per 1,000 population and the average rate of property crimes was 48 per 1,000 population. The high standard deviations among these variables (especially for property crimes) suggest that crime rates vary across neighborhoods.

Analytic Strategy

In order to test the hypotheses, multilevel models were implemented in HLM 6 (HLM, 2008; Raudenbush & Bryk, 2002). All models were run separately for each of the two dependent variables examined: values distrust and competence distrust. We estimated sequential models where the race-distrust relationship was tested with no other predictors in Model I. We added additional individual-level predictors by measure categories: Demographics (Model II), Socioeconomic Status (Model III), and Health Status and Access to Health Services (Model IV). The neighborhood-level direct associations measures are added separately in Model V (Neighborhood Disorganization measures) and Model VI (Neighborhood Crime Rate measures) and simultaneously in Model VII. The final model (Model VIII) adds the moderating associations (cross-level interactions).

One of the strengths of hierarchical modeling is to allow researchers to formulate and examine hypotheses regarding how factors measured at one level influence the associations occurring at another (Raudenbush & Bryk, 2002). While such cross-level interactions are common in social science research, they have not been well integrated into health studies until recently (Boardman, 2004; Matthews & Yang, 2010). A healthy environment plays an important role in determining individual health (Cummins et al., 2007); however, little is known about how environmental factors get under the skin and contribute to an individual's attitude toward the health care system. By testing the cross-level interaction effects, this study is able to further clarify the associations between neighborhood social environment, such as social affluence, and the formation of distrust.

Results

Values distrust

The results of the multilevel regression models of health care system values distrust are displayed in Table 3. Without considering any other covariates (Model I), individuals of African American race had higher values distrust than whites. By including other demographic characteristics (Model II), the effect of race on values distrust became stronger. Older respondents reported higher values distrust than younger respondents. This finding is consistent with what was identified in a recent study by Hammond (2010). The socioeconomic status measures were included in Model III, which slightly suppressed the effect of race on values distrust. Those who were living below the poverty line had greater values distrust than those who were not living in poverty. When compared to those with less than a high school education, respondents with some college education had greater values distrust.

The health status and access to health services measures were added in Model IV. When controlling for all individual-level variables, race was significantly associated with values distrust, with African American respondents reporting higher values distrust. In addition, the

more stress a respondent reported, the higher the values distrust; those respondents who had experienced transportation difficulties when trying to receive health care also reported higher values distrust.

Model V includes the neighborhood-level measures residential stability, neighborhood disadvantage, and social affluence. The inclusion of these neighborhood disorganization measures did not affect the association between race and values distrust. Those respondents who lived in a socially affluent neighborhood reported lower values distrust; however, this relationship was only marginally significant. The neighborhood crime rates were examined in Model VI without the measures of neighborhood disorganization. When controlling for neighborhood crime, the effect of race on value distrust remained significant. Respondents who lived in neighborhoods with high violent crime rates experienced higher values distrust.

In Model VII, all neighborhood social environment measures were included and race continues to be associated with values distrust. This did not affect the findings at the individual-level, but did affect the associations at the neighborhood-level. When measures of neighborhood disorganization and neighborhood crime rates were included together, the effect of the violent crime rate on values distrust was no longer significant. Neighborhood crime rates and neighborhood disorganization were intercorrelated, because accounting for crime rates strengthened the association between social affluence and values distrust.

The cross-level interaction effects were tested in Model VIII. The inclusion of the interaction between race and social environment factors did not alter the findings at the individual-level, and it should be noted that the association between race and values distrust became the strongest (0.290) in the final model. Controlling for the cross-level interactions made neighborhood disadvantage and the property crime rate into significant predictors for values distrust. High concentrations of disadvantaged social groups and property crimes directly and negatively affected individuals' perceptions of institutional performances; and thus, the values distrust increased. In addition, the relationship between race and values distrust depends upon the residential stability of the neighborhood. Specifically, *ceteris paribus*, the effect of race on values distrust would be attenuated by 0.171 if a respondent who is African American moves from one neighborhood to another neighborhood that has a one unit increase in the residential stability score. While residential stability was not directly associated with values distrust, it still participated in the formation of values distrust by moderating the relationship between race and values distrust. Residential stability was negatively associated with property crime rates ($r=-0.503$) and social affluence ($r=-0.519$). With the social disorganization theory and the institutional performance model, a stable neighborhood would lead to a positive perception of a living environment and therefore, decrease African American respondents' distrust in the health care system. In addition, the inclusion of the interaction effects in Model VIII seemed to further explain why the levels of values distrust differed across neighborhoods, because the variance component became non-significant in the final model.

Competence distrust

The results for competence distrust are provided in Table 4. Without considering any other covariates (Model I), no significant relationship between race and competence was identified. Demographic characteristics were added in Model II and we found that with every year increase in a respondent's age, the respondent's competence distrust decreased by 0.007. Model III included measures of SES and the results suggest that those respondents with some college education and post-college education had significantly higher competence distrust than those respondents with less than a high school degree.

When the health status and access to health services measures were added in Model IV, the marital status-competence distrust relationship became significant, with married respondents having higher competence distrust than single respondents. The inclusion of these measures also caused the age-competence distrust relationship to become insignificant. In addition, we found that those individuals who reported higher levels of stress also reported higher levels of competence distrust. Insured respondents had less competence distrust than respondents who did not have any form of health insurance coverage. Individuals who reported having a regular health care source also reported lower competence distrust than their counterparts without a regular health care provider. We also found that those respondents who experienced transportation difficulties when trying to make a medical appointment had higher competence distrust.

None of the neighborhood social environment factors was directly associated with competence distrust (Models VI-VII), and all the individual-level predictors remained unchanged in the final model (Model VIII). However, disadvantage was found to moderate the relationship between race and competence distrust. Assuming all things are equal, African American respondents who lived in a neighborhood with a high concentration of disadvantaged social groups had the competence distrust that was, on average, 0.165 higher than their counterparts in a better-off neighborhood. Similar to values distrust, higher social disadvantage scores may result in worse neighborhood perception and stronger distrust. It should also be noted that as we found that competence distrust was more strongly associated with access to health care than other individual-level characteristics, one plausible explanation for the moderating effect of disadvantage between race and competence distrust may be that there is less investment in health care infrastructure in neighborhoods with high disadvantage scores than in those neighborhoods with low scores (Daly et al., 1998; Kawachi et al., 1997). Therefore, residents of disadvantaged neighborhoods may not receive sufficient medical care services and in turn have high levels of competence distrust. Due to data limitations, this explanation could not be tested in this study, but warrants future investigation.

Discussion

Using a newly developed dual-dimensional health care system distrust scale, we are able to test each of our proposed hypotheses. By including all individual-level predictors in the model, we are able to confirm H1 and find that respondents who are of African American race have greater values distrust than white respondents. In addition, beyond the individual-level factors, the neighborhood social environment plays a role in understanding how people evaluate the health care system, confirming H2. Following social disorganization theory, we anticipated strong associations between neighborhood covariates and distrust (H3); however, only neighborhood social stability and property crime rates followed our hypotheses (H3a, H3b). Specifically, the positive association between race and values distrust was diluted if a respondent who is African American moves to a more stable neighborhood (H4). Somewhat surprisingly, the property crime rate was found to attenuate the positive relationship of race with values distrust. One plausible explanation for this finding is that we did not take into account other social environment variables such as social capital due to data limitations. Future efforts are warranted to explore this issue. Also, the determinants of values and competence distrust are not the same, and this study confirms that it is necessary to discuss these dimensions of distrust separately in future studies. We found that competence distrust is more likely to be determined by individual characteristics than values distrust, especially health status and access to health services. Note that we did not find a significant association between race and competence distrust, which echoes the finding reported by Armstrong et al. (2008). These findings indicate that people who have frequently interacted with the

health care system may have a more positive attitude toward the system's competence, providing a starting point to improve Americans' trust in health care.

The strong associations between access to health care services and competence distrust echo the institutional performance argument that the public recognizes whether institutions perform well and react accordingly. Specifically, it has been suggested that increasing distrust is the result of the rise in managed care, the limits on choices of health care providers, and the commercialization of health care (Emanuel & Dubler, 1995; Illingworth, 2002). The changes in the health care system lead patients to question whether the health care system is competent, responsible, honest, and caring, and hence, affect the levels of distrust (Mechanic & Schlesinger, 1996). Similarly, as discussed previously, the ethical issues in medical studies and scandals about maltreatment have dramatically drawn the public's attention and increased fear about victimization and exploitation. The significant relationships between race and values distrust confirms this proposition and suggests that these histories provoke the decline in distrust even among people who are not directly involved in these events. The indirect associations between neighborhood social environment and distrust also substantiate the argument by Blendon (2007). The perception of the neighborhood and other social institutions is related to how people judge the health care system. High poverty and crime rates, as well as unstable neighborhoods, may be the signals of poor institutional performances, and hence, contribute to the formation of health care system distrust.

Methodologically, this study demonstrates the value of using a multilevel modeling approach to explore the cross-level effects, which has not been fully utilized in earlier distrust research. Multilevel modeling was particularly useful for identifying neighborhoods in which the social environment has a greater impact on distrust. The cross-level interactions identified in the final models for both values and competence distrust suggested that some social environmental factors might not be directly associated with the formation of distrust, but played a role in modifying the relationship between race and distrust. Following recent literature on investigating how environmental factors get under the skin (Boardman, 2004; Matthews & Yang, 2010; Yang, Matthews & Shoff, 2011), this study found that neighborhood social factors are important determinants because they change the association between race and distrust. More specifically, neighborhood stability and social disadvantage indirectly affect individual's distrust via race/ethnicity, a historic dimension of health disparities in the US as discussed previously. Therefore, with a multilevel modeling approach, not only can we identify the factors that are associated with increases/decreases in distrust, but also suggest mechanisms to be explored in future analyses.

Conclusions

This study has several limitations. First, due to data constraints, several individual and environmental variables are not included in the analysis such as racism and discrimination at the individual-level and social capital at the neighborhood-level, as discussed above. We believe that future surveys would benefit from the inclusion of both measures of health care system distrust, discrimination, and racism so that these associations can be tested in the future. Second, while previous research has found that respondents who are of racial/ethnic minorities are more likely to question physician behavior, more research is needed to explore whether distrust in the health care system is higher among individuals of other minority groups. Third, the causality between distrust and the explanatory covariates is not fully established, because the data are cross-sectional. Fourth, like many previous studies, the results of this study are specific to Philadelphia County, U.S.A., and may not be generalized to other regions/places. Finally, there is no agreement on the definition of neighborhood in the literature; hence, the findings related to neighborhood social

environment might depend upon the definition of neighborhood. While changing the spatial scale of the unit of analysis may lead to different conclusions (Openshaw, 1984); we believe the predefined Philadelphia neighborhood boundary is the best choice for the level-2 unit of analysis. The neighborhood is preferable for this study over other common measures of neighborhood (e.g., census tracts, zip code areas, or counties) because in the US, the average trip distance to work, work related business, shopping, personal/family errands, school, religious, and recreational activities is approximately 10 to 20 miles (USDOT, 2009), which is much larger than the average ZIP code or census tract area, but well below the average county size.

Several policy implications can be drawn from the findings of this study. First, the moderating effects of neighborhood social environment (e.g., residential stability) on the relationship between race and values distrust suggests that helping residents to become homeowners or providing affordable housing units would reduce the values distrust among African Americans. Decreased health care system distrust is associated with the increase in the odds of using preventive health services and reporting good self-rated health (LaVeist et al., 2009; Yang, Matthews & Hillemeier, 2011; Yang, Matthews & Shoff, 2011). These changes may in turn improve population health. Second, as competence distrust is more closely associated with access to health care services than other social environmental factors, the policies aimed at offering accessible and quality health care should be encouraged, such as providing transportation to medical appointment and improving the communication skills of medical staff. Third, ameliorating the neighborhood socioeconomic conditions, e.g., reducing poverty and crime rates, would improve the perception of social institutions, enhance trust in health care practices, and further minimize the racial disparity in health care system distrust. These actions would be particularly helpful for recovering the lost trust among minority groups, which is a result of past medical scandals and histories.

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Table 1

Factor loadings with Varimax rotation

PHMC 2008 Survey Questions		
Respondents were asked, "Would you say you... [Strongly disagree; Disagree; Neither agree nor disagree; Agree; Strongly agree]"		
	Components	
	Competence	Values
a. The health care system does its best to make patient's health better. ^a	0.731	0.153
b. The health care system covers up its mistakes.	-0.036	0.660
c. Patients receive high quality medical care from the health care system. ^a	0.791	0.143
d. The health care system makes too many mistakes.	0.260	0.627
e. The health care system puts making money above patients' needs.	0.327	0.656
f. The health care system gives excellent medical care. ^a	0.785	0.172
g. Patients get the same medical treatment from the health care system, no matter what the patients' race or ethnicity. ^a	0.552	0.280
h. The health care system lies to make money.	0.298	0.697
i. The health care system experiments on patients without them knowing.	0.181	0.665

^aItem is reverse coded

Table 2

Descriptive statistics of variables at both individual and neighborhood-levels

Variables	Total Sample		African Americans		Whites	
	N=3,746	S.D.	N=1,897	S.D.	N=1,849	S.D.
Individual-Level						
Values Distrust	0.01	1.00	0.12	0.97	-0.10	1.01
Competence Distrust	0.01	0.99	0.06	1.00	-0.04	0.99
Demographics						
African American ^a	51.00	0.50	---	---	---	---
Male ^a	32.00	0.47	27.00	0.45	36.00	0.48
Age	51.98	16.80	49.34	16.51	54.69	16.67
Marital Status (Single=reference)						
Married ^a	42.00	0.49	34.00	0.47	50.00	0.50
Widowed/Divorced/Separated ^a	27.00	0.44	26.00	0.44	27.00	0.45
Socioeconomic Status (SES)						
Employed ^a	57.00	0.50	57.00	0.50	57.00	0.50
Poverty ^a	13.00	0.34	19.00	0.39	7.00	0.26
Education (Less than HS=reference)						
High School ^a	40.00	0.49	42.00	0.49	37.00	0.48
Some College ^a	22.00	0.41	23.00	0.42	20.00	0.40
College ^a	17.00	0.38	16.00	0.36	19.00	0.40
Post-College ^a	11.00	0.31	7.00	0.25	15.00	0.36
Health Status						
Number of Health Conditions	0.74	0.90	0.75	0.93	0.73	0.86
Level of Stress	5.26	2.79	5.21	2.93	5.32	2.64
Insured ^a	92.00	0.27	89.00	0.31	94.00	0.23
Access to Health Services						
Regular Source of Care ^a	90.00	0.29	90.00	0.30	91.00	0.29

Variables	Total Sample		African Americans		Whites	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Transportation Problem ^a						
	12.00	0.32	15.00	0.36	8.00	0.27
<u>Neighborhood-Level</u>						
Neighborhood Disorganization						
Residential Stability	0.00	0.93	---	---	---	---
Neighborhood Disadvantage	0.00	1.00	---	---	---	---
Social Affluence	0.00	1.00	---	---	---	---
Neighborhood Crime Rates						
Violent Crime Rate	12.60	6.52	---	---	---	---
Property Crime Rate	47.94	17.14	---	---	---	---

^aFor dummy variables, the mean values represent the percentage of the groups coded 1.

Table 3

Multilevel regression models of health care system values distrust with individual-level and neighborhood-level variables (N=3,746)

Variables	Model I	Model II	Model III	Model IV	Model V	Model VI	Model VII	Model VIII
<u>Individual-Level (N=3,746)</u>								
Intercept	-0.103**	-0.461***	-0.656***	-0.991***	-0.997***	-0.955***	-0.861***	-0.924***
Demographics								
African American	0.139**	0.183***	0.157***	0.170***	0.148***	0.147***	0.149***	0.290*
Male		-0.016	-0.011	0.018	0.017	0.016	0.019	0.017
Age		0.008***	0.008***	0.010***	0.010***	0.010***	0.010***	0.010***
Marital Status (Single=reference)								
Married		-0.032	-0.009	0.003	0.008	0.006	0.007	0.005
Widowed/Divorced/Separated		-0.058	-0.043	-0.049	-0.049	-0.049	-0.049	-0.056
Socioeconomic Status (SES)								
Employed			0.033	0.066	0.062	0.065	0.060	0.065
Poverty			0.172**	0.122*	0.117†	0.119†	0.118†	0.115†
Education (Less than HS=reference)								
High School			0.097	0.101	0.110	0.105	0.107	0.111
Some College			0.275***	0.272***	0.285***	0.277***	0.283***	0.283***
College			0.067	0.073	0.098	0.083	0.097	0.109
Post-College			-0.017	-0.022	0.027	-0.005	0.025	0.051
Health Status								
Number of Health Conditions				0.019	0.018	0.018	0.018	0.018
Level of Stress				0.035***	0.035***	0.036***	0.035***	0.035***
Access to Health Services								
Insured				-0.090	-0.086	-0.089	-0.086	-0.089
Regular Source of Care				0.076	0.075	0.079	0.075	0.076
Transportation Problem				0.147*	0.143*	0.145*	0.145*	0.147*
<u>Neighborhood-Level (N=45)</u>								
<i>Direct Associations</i>								
Neighborhood Disorganization								

Variables	Model I	Model II	Model III	Model IV	Model V	Model VI	Model VII	Model VIII
Residential Stability					-0.010		-0.030	0.065
Neighborhood Disadvantage					-0.006		0.030	0.107 [†]
Social Affluence					-0.077 [†]		-0.093 [*]	-0.064
Neighborhood Crime Rates								
Violent Crime Rate						0.008 [*]	-0.008	-0.015 [†]
Property Crime Rate						-0.003 [†]	-0.000	0.003 [*]
<i>Moderating Associations</i>								
Neighborhood Disorganization								
Residential Stability								-0.171 ^{***}
Neighborhood Disadvantage								-0.133
Social Affluence								-0.018
Neighborhood Crime Rates								
Violent Crimes								0.013
Property Crimes								-0.006 ^{***}
<i>Variance Components</i>								
Intercept	0.009 ^{***}	0.010 ^{***}	0.008 ^{**}	0.006 ^{**}	0.003 [*]	0.005 ^{**}	0.003 [*]	0.002
* <i>p</i> 0.05;								
** <i>p</i> 0.01;								
*** <i>p</i> 0.001;								
[†] <i>p</i> 0.10								

Table 4

Multilevel regression models of health care system competence distrust with individual-level and neighborhood-level variables (N=3,746)

Variables	Model I	Model II	Model III	Model IV	Model V	Model VI	Model VII	Model VIII
<u>Individual-Level (N=3,746)</u>								
Intercept	-0.014	0.333***	0.158	0.103	0.105	0.038	0.076	-0.016
Demographics								
African American	0.051	0.015	0.032	0.044	0.025	0.023	0.023	0.233
Male		-0.074	-0.072	-0.071	-0.071	-0.073	-0.072	-0.073
Age		-0.007***	-0.007***	-0.003 [†]	-0.003 [†]	-0.003 [†]	-0.003 [†]	-0.003*
Marital Status (Single=reference)								
Married		0.096 [†]	0.081	0.101*	0.106*	0.106*	0.106*	0.105*
Widowed/Divorced/Separated		0.074	0.079	0.068	0.069	0.069	0.070	0.068
Socioeconomic Status (SES)								
Employed			0.024	0.061	0.061	0.062	0.062	0.060
Poverty			0.054	-0.010	-0.015	-0.015	-0.016	-0.019
Education (Less than HS=reference)								
High School			0.059	0.061	0.068	0.068	0.067	0.067
Some College			0.160*	0.170*	0.179*	0.179*	0.179*	0.177*
College			0.126	0.155 [†]	0.165 [†]	0.165 [†]	0.164 [†]	0.162 [†]
Post-College			0.278***	0.292***	0.303***	0.305***	0.303***	0.307***
Health Status								
Number of Health Conditions				0.026	0.026	0.025	0.026	0.027
Level of Stress				0.039***	0.039***	0.039***	0.039***	0.039***
Access to Health Services								
Insured				-0.210**	-0.210**	-0.209**	-0.210**	-0.212**
Regular Source of Care				-0.228***	-0.228***	-0.227***	-0.227***	-0.227***
Transportation Problem				0.170*	0.167*	0.167*	0.166*	0.166*
<u>Neighborhood-Level (N=45)</u>								
Direct Associations								
Neighborhood Disorganization								

Variables	Model I	Model II	Model III	Model IV	Model V	Model VI	Model VII	Model VIII
Residential Stability					-0.031		-0.032	-0.094
Neighborhood Disadvantage					0.014		-0.007	-0.102
Social Affluence					-0.030		-0.025	-0.095
Neighborhood Crime Rates								
Violent Crime Rate						0.007 [†]	0.005	0.016
Property Crime Rate						-0.000	-0.001	-0.001
<i>Moderating Associations</i>								
Neighborhood Disorganization								
Residential Stability								0.105
Neighborhood Disadvantage								0.165 [*]
Social Affluence								0.134 [†]
Neighborhood Crime Rates								
Violent Crimes								-0.017
Property Crimes								-0.000
<i>Variance Components</i>								
Intercept	0.007 ^{**}	0.007 [*]	0.007 [*]	0.005 [*]	0.005 [*]	0.005 [*]	0.006 [*]	0.006 [*]
* <i>p</i> 0.05;								
** <i>p</i> 0.01;								
*** <i>p</i> 0.001;								
[†] <i>p</i> 0.10								