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Does Attending Worship Mitigate Racial/Ethnic Discrimination in Influencing Health Behaviors? Results From an Analysis of the California Health Interview Survey

Julia T. Caldwell, MPH[1], and Lois M. Takahashi, PhD[1]

Abstract

Existing research suggests that religious institutions play a significant role in improving the health of communities, particularly those coping with racial and ethnic discrimination. Using the California Health Interview Survey, this article examines the relationship of self-reported experiences of racial/ethnic discrimination, worship attendance, and several health behaviors. Supporting existing research, higher self-reported racial/ethnic discrimination is associated with worse health behaviors. Logistic regression models indicate that the odds of engaging in healthy lifestyle behaviors significantly increase for those who report attending worship, compared with those who do not attend worship, with variations by race/ethnicity. Worship attendance moderates the association between discrimination and binge drinking, but does not moderate the association for smoking, walking, or being obese. Findings suggest that religious attendance plays an important role in the health and well-being of all population groups. More research is needed to ascertain the reasons why attending worship may have the ability to mitigate the relationship between racial/ethnic discrimination and health.

Keywords

health disparities, race/ethnicity, religion & health, social determinants, social inequalities

Prior research suggests that racial and ethnic discrimination may lead to the development of unhealthy lifestyle behaviors that negatively influence the mental and physical health of populations (Bird & Bogart, 2001; Gee, 2002; Pascoe & Richman, 2009; Shariff-Marco, Klassen, & Bowie, 2010; Williams, Neighbors, & Jackson, 2003). Involvement with a religious institution may influence the relationship between discrimination and health, as growing evidence suggests the positive effects of religion and religious involvement on health (Ellison, 1998; Olphen et al., 2003; Thoresen & Harris 2002).

Research that focuses both on the discrimination–health connection as well as the religion–health phenomenon focus primarily on differences between Blacks and Whites (Pascoe & Richman, 2009; Wong, Rim, & Perez, 2008). However, with demographic shifts occurring throughout the United States, more research is needed to further explore the role of religious attendance and discrimination experiences by including other racial/ethnic groups (Lauderdale, Wen, Jacobs, & Kandula, 2006; Wong et al., 2008). Using a racially/ethnically diverse sample, this study addresses this gap by examining the association between perceived racial/ethnic discrimination and health behaviors and the potential moderating effect of religious worship attendance. This article analyzes a population-based random digit dial phone survey of California residents and uses the most common measure in the study of religion and health, religious service attendance (Chatters, 2000). Before turning to a description of the California Health Interview Survey data and the analysis, we first briefly review the literature on discrimination, the role of religious worship attendance, and health behaviors.

Discrimination and Health Behaviors

There are a number of ways in which discrimination is hypothesized to negatively influence health (Pascoe &

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Richman, 2009; Williams & Mohammed, 2009). First, research suggests that discrimination limits socioeconomic resources, such as reducing health care access (Krieger, 2000). Others suggest that health disparities result from differential experiences of discrimination within the health care setting because of the patient's racial/ethnic identity or immigration status (Lauderdale et al., 2006). Another hypothesis suggests that the chronic stresses of discrimination invoke a physiologic response leading to a wear and tear on the body (Williams et al., 2003). Studies have identified that exposure to discrimination increases stress (Bird & Bogart, 2001; Ellison et al., 2001) and that negative coping behaviors result from increases in experiences of discrimination (Krieger, 2000; Williams et al., 2003). For example, research shows that experiences of racism are associated with smoking, alcohol use, and obesity (Borrell et al., 2010; Shariff-Marco et al., 2010; Terrell, 2006).

Worship Attendance and Health Behaviors

While discrimination may result in detrimental behaviors and poor health, research suggests that religious involvement has the ability to promote mental and physical well-being (Chatters, 2000). For example, in the United States, frequent public involvement with a religious institution, such as attending worship, is associated with lower blood pressure and lower total stress levels in women (Gillium & Ingram, 2006; Masleko, Kubzansky, Kawachi, Seeman, & Berkman, 2007). Religious involvement also reduces risks associated with mortality (Hummer, Rogers, Nam, & Ellison, 1999; Strawbridge, Cohen, Shema, & Kaplan, 1997; Strawbridge, Cohen, & Shema, 2000).

Possible explanations for these observed influences of religious involvement on health outcomes are varied (Ellison, 1998), including both coercive and supportive factors. Coercive factors include informal religious community pressure on individuals (Ellison, 1994), religious organizational discipline and prohibition of behaviors, such as restricting alcohol use (Idler, 2010), and more broadly, the ethical and moral teachings of religious communities that discourage deviant behaviors (Ellison, 1998). Supportive factors include church-based friendships and networks, and distinctive information for individual members that emphasize value and worth (Krause & Wulff, 2005).

Worship Attendance and Discrimination

In general, religious institutions have historically aided in efforts to battle discriminatory laws and practices (Baer & Singer, 1992; Lincoln & Mamuya, 1990). Particularly in the Black community, the church is commonly seen as the center of spiritual, social, and political life. Religious bodies may be familiar with relevant social issues and are likely to offer social support (Bierman, 2006; Idler & Kasl, 1997). Resources may be related to the religious community itself, rather than the service specifically, as religious organizations
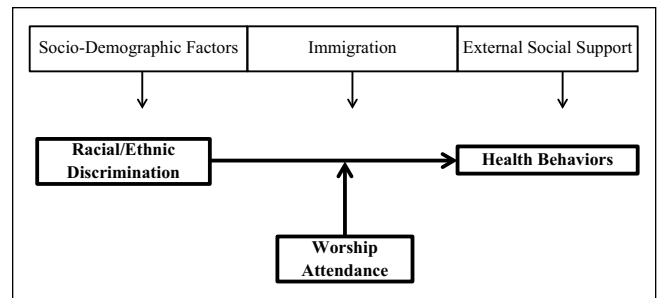

Figure 1. Conceptual framework of racial/ethnic discrimination, worship attendance, and health behaviors

and churches offer emotional and instrumental social support when individuals experience psychological distress. Additionally, religious organizations may have the ability to cater to less socially integrated populations, such as immigrants (Cadge & Ecklund, 2006). Factors associated with the religious service itself, such as messages about overcoming and forgiving persecutors may influence perceived discrimination (Bierman, 2006).

To examine the potential moderating role of religious service attendance, this article offers an analysis based on the conceptual model in Figure 1. We focus on four health behavioral outcomes (all self-reported): smoking, binge drinking, walking, and being obese and hypothesize (a) worship attendance is associated with lower odds of smoking, binge drinking, and being obese, and higher odds of reported walking. We also hypothesize that (b) racial/ethnic differences emerge when looking at the association between worship and health behaviors. Finally, we hypothesize that (c) the relationship between discrimination and health behaviors is moderated by worship attendance.

Data and Method

The California Health Interview Survey (CHIS) is a cross-sectional, population-based random-digit dial telephone survey conducted every 2 years. CHIS is conducted in English, Spanish, Mandarin, Cantonese, Vietnamese, and Korean. In 2003, there was a 33.5% response rate, similar to other large national telephone surveys in California, such as the Behavioral Risk Factor Surveillance System survey.

The CHIS Public Use File (PUF) 2003 (CHIS, 2010) was used for the analysis. All missing values were previously imputed by CHIS through random selection as well as hot deck imputation without replacement. Only adult interviews were included in this analysis (proxy interviews were excluded) for a final sample of 41,873 adults. Household weights are created for all households that complete the CHIS screener, which is used to compute a person-level weight. To adjust the person-level weight, a raking method is used, ensuring that CHIS estimates are consistent with population control totals. Weights reflect 2000 U.S. Census-based population

demographics and are adjusted for nonresponse and households without telephones. For our analysis, replicate weights were used, allowing the CHIS sample to be representative of the noninstitutionalized population in California.[1]

Four binary outcome health behaviors were used as dependent variables: current smoking status, binge drinking in the past month, walking in the past 7 days, and being obese. Current smoking status was constructed with two questions: (a) whether the respondent smoked 100 or more cigarettes in entire lifetime (binary) and (b) whether the respondent currently smokes cigarettes everyday, some days, or not at all. To construct the binary dependent variable, the following definition was used: those who reported smoking 100 or more cigarettes in their lifetime and smoked "everyday" or "some days" were coded as "yes." Those who reported never smoking 100 or more cigarettes in their lifetime or reported "not at all" were coded as "no." Binge drinking status was constructed from two variables: (a) whether the respondent had at least one alcoholic drink in the past 30 days and (b) number of times the respondent had 5 or more alcoholic drinks at once in the past 30 days. If respondents reported binge drinking one or more times, they were coded as "yes"; those who reported zero, were recoded as "no."

Walking assessed whether the respondent walked at least 10 minutes for fun, relaxation, exercise, or to walk the dog in the past 7 days, which was coded as "yes" or "no." The Centers for Disease Control and Prevention (CDC) suggests that physical activity, including walking briskly for 10 or more minutes, 3 times a day, for 5 days a week can improve health (CDC, 2011). Walking for transportation was not included and respondents who reported being unable to walk were categorized as not walking. Obesity was based on self-reported height and weight and from these measurements the respondent's body mass index (BMI) was estimated. Those respondents who were underweight (BMI <18.5 kg/m^2), normal (BMI = 18.5-24.99 kg/m^2), and overweight (BMI = 25.0-29.99 kg/m^2) were coded as "no." Respondents who were obese (BMI ≥30.0 kg/m^2) were coded as "yes."

The independent variable, racial/ethnic discrimination asked respondents: "Thinking about your race or ethnicity, how often have you felt treated badly or unfairly because of your race or ethnicity? Would you say . . . Never, Rarely, Sometimes, Often, or All the time?" The response categories were coded to be binary, with "Frequent" representing adults who experience discrimination at least sometimes (which includes "Sometimes", "Often", "All the time"), and "Infrequent" for those who reported that they "Never" or "Rarely" experience discrimination. The religious attendance variable was operationalized as attending a church, temple, or another place of worship for services or other activities in the past 7 days, "yes" or "no."

Covariates included self-reported gender, age, race/ethnicity, education, poverty, and insurance status. Previous research indicates these predictors to be associated with discrimination, religious involvement, and the health behavior

outcomes of interest (Idler, 2010, Shariff-Marco et al., 2010). Additionally, immigration status (i.e., citizenship status) was included as a covariate in the models (Lauderdale et al., 2006). In order to capture community-level social support (Kawachi, Subramanian, & Kim, 2008) outside of a religious institution, a covariate was included in the models asking respondents if they agree people in their neighborhood are willing to help each other.

All analyses were conducted using STATA (Version 10.1) with the applied jackknife replicate weights provided by CHIS to accommodate for the survey design. Chi-squared tests with a standard of $p < .05$ were used to identify significant predictor variables to include in the model. A correlation matrix was used to identify any issues of over-fitting among variables. Basic demographic characteristics of the population and unadjusted odds ratios were calculated to determine the odds of worship attendance and experiencing discrimination frequently.

Multivariate logistic regression models estimated the overall association of worship attendance on each of the four health behavioral outcome variables and then by each racial and ethnic group. Four multivariate models show the association of discrimination and worship attendance on each health behavior. An interaction term tested for whether discrimination and worship together are associated with each of the four health behaviors. Caution should be taken when comparing odds ratios across nested models because of the fixed variance in logistic regression models (Mood, 2010).

Results

Table 1 presents weighted distributions of selected sociodemographic characteristics for the 2003 CHIS. Over half of the sample is older than 40 years, with an even distribution of males and females. Nearly half the sample is non-Hispanic (NH) White (49%), and 31% report being Latino. More than 16% of the sample reported being a current smoker, 15% reported binge drinking in the past 30 days, 56% walked for leisure or exercised in the past 7 days, and 21% of the sample was obese.

Unadjusted odds ratios indicate that females, older adults, and immigrants were more likely to report attending worship in the past 7 days. Compared with NH Whites, all other races were significantly more likely to attend worship. For those attending worship, the unadjusted odds of being a current smoker decrease by 50% ($p < .05$) and by 54% ($p < .05$) for binge drinking, compared with those who do not attend worship. The unadjusted odds of walking in the past 7 days increased by 24% ($p < .05$) for worship attendees, compared with those who did not attend worship. Worship attendance was not significantly associated with obesity.

Unadjusted odds ratios for self-reported experiences of discrimination indicate that men, 25- to 39-year-olds, and those with less education were more likely to report discrimination frequently. Compared with NH Whites, the odds of

Table 1. Weighted Frequencies of Sociodemographic Characteristics and Unadjusted Odds Ratio of Worship Attendance and Discrimination, California Health Interview Survey, 2003 (CHIS, 2010).

Characteristics	Total Sample		Attended Worship in Past 7 days		Experiences Discrimination at Least Sometimes	
	n	Weighted %	Weighted %	OR	Weighted %	OR
	41,873	100				
Gender						
Male (Ref)	17,377	48.9	44.4	1.0	52.2	1.0
Female	24,496	51.0	55.6	1.35*	47.8	0.85*
Age (in years)						
18-24	3,444	13.7	11.3	0.69*	14.1	0.98
25-39	10,402	30.7	28.7	0.82*	35.3	1.13*
40-64 (Ref)	19,520	41.3	43.5	1.0	43.3	1.0
65+	8,507	14.3	16.4	1.16*	7.4	0.42*
Race/ethnicity						
White, NH (Ref)	25,102	48.7	41.3	1.0	24.8	1.0
Latino	8,750	30.8	34.2	1.54*	40.9	3.28*
Black, NH	2,538	6.1	8.0	2.11*	15.4	10.04*
Asian, NH	3,791	11.6	13.9	1.74*	15.4	3.25*
Other, NH[a]	1,692	2.8	2.7	1.22*	3.6	3.18*
Education						
Less than high school	5,254	20.2	21.0	1.03	24.3	1.59*
High school diploma/some college/AA or AS degree	21,830	49.0	47.5	0.92*	49.9	1.27*
BA/BS or more (Ref)	14,789	30.8	31.5	1.0	25.8	1.0
Poverty level						
0-99% FPL	4,820	15.1	15.7	1.18*	18.9	1.76*
100-199% FPL	7,155	18.8	20.4	1.26*	23.8	1.78*
200-299% FPL	6,022	13.9	14.9	1.24*	15.2	1.46*
300% FPL and above (Ref)	23,876	52.2	49.0	1.0	42.2	1.0
Currently insured						
Yes (Ref)	36,776	83.3	84.1	1.0	77.6	1.0
No	5,097	16.7	15.9	0.91*	22.4	1.63*
Immigration status						
U.S. born (Ref)	31,477	66.5	61.3	1.0	58.0	1.0
Naturalized citizen	5,338	14.9	18.6	1.67*	18.7	1.60*
Noncitizen	5,058	18.6	20.1	1.28*	23.3	1.60*
People in neighborhood willing to help						
Agree (Ref)	36,776	86.2	87.3	1.0	77.5	1.0
Disagree	5,097	13.8	12.7	0.86*	22.6	2.28*
Current smoker						
No (Ref)	35,245	83.5	88.9	1.0	79.5	1.0
Yes	6,628	16.5	11.1	0.50*	20.5	1.42*
Binge drinker						
No (Ref)	36,532	84.9	90.6	1.0	83.1	1.0
Yes	5,341	15.1	9.5	0.46*	16.9	1.19*
Walks for leisure/exercise						
No (Ref)	18,145	44.4	41.1	1.0	45.4	1.0
Yes	23,728	55.6	58.9	1.24*	54.6	0.95
Obese						
No (Ref)	33,289	79.5	79.3	1.0	74.6	1.0
Yes	8,584	20.5	20.7	1.05	25.4	1.35*

Note. OR = unadjusted odds ratio; FPL = federal poverty level; NH = non-Hispanic; Ref = reference.
a. Other race includes American Indian/Alaska Native, Native Hawaiian, other one race or two+ race.
*$p < .05$.

Table 2. Adjusted Odds Ratio of Attending Worship on Health Behaviors, Stratified by Race/Ethnicity, California Health Interview Survey, 2003 (CHIS, 2010), *n* = 41,873.

	Total Population	Whites	Blacks	Latinos	Asians
Health Behaviors	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Current smoker	0.56** (0.51, 0.61)	0.45**(0.40, 0.52)	0.47** (0.35, 0.65)	0.66** (0.55, 0.80)	0.79 (0.60, 1.04)
Binge drinker	0.54** (0.49, 0.60)	0.44** (0.39, 0.51)	0.66 (0.43, 1.02)	0.58** (0.49, 0.67)	0.87 (0.60, 1.23)
Walks for leisure/exercise	1.25** (1.17, 1.33)	1.22** (1.14, 1.31)	1.24 (0.99, 1.56)	1.29** (1.12, 1.48)	1.33* (1.08, 1.63)
Obese	1.02 (0.95, 1.10)	1.04 (0.94, 1.14)	1.09 (0.86, 1.40)	0.95 (0.82, 1.09)	0.97 (0.67, 1.40)

Note. Reference group is those that did not attend worship. AOR = adjusted odds ratio. The total population models are adjusted for gender, age, race/ethnicity, education, poverty, insurance status, immigration status, and neighborhood social support. The stratified models adjust for the same covariates, except race/ethnicity; caution should be taken when comparing odds ratios across nested models because of fixed variance in logistic models. Unweighted *n* for Whites is 25,102, for Blacks is 2,538, for Latinos is 8,750, and for Asians is 3,791.
*p < .05. **p < .01.

frequently experiencing discrimination increased for Latinos, Blacks, and Asians. For those who frequently experience discrimination, the unadjusted odds ratios of being a current smoker increased by 42% (p < .05) and by 19% (p < .05) for binge drinking, compared with those who experienced discrimination infrequently. Discrimination is not significantly association with walking. The odds of being obese increased by 35% (p < .05) for those who report experiencing discrimination at least sometimes, compared with those who experience discrimination infrequently.

Table 2 presents the adjusted odds ratio of attending worship on health behaviors, by race/ethnicity. For all racial/ethnic groups, controlling for gender, age, race/ethnicity, education, poverty, insurance status, immigration status (citizenship), and neighborhood social support, those who attend worship are significantly less likely to report being a current smoker and binge drinker and are more likely to walk. Among Whites and Latinos, the same associations remain significant. Worship attendance has no association with obesity. For Blacks who attend worship, the adjusted odds of being a current smoker decrease by 53% (p < .01) when compared with Blacks who do not attend worship. Worship attendance does not appear to influence walking among Blacks. Among Asians, worship attendance increases the odds of walking by 33% (p < .05). Worship attendance is not associated with smoking and binge drinking among Asians.

Table 3 reports the tests of whether the relationship between self-reported discrimination and the studied health behavior outcomes is moderated by worship attendance, controlling for sociodemographic characteristics. Frequently experiencing discrimination increases the odds of being a current smoker (OR = 1.26, p < .01), but it is not associated with binge drinking or walking. Experiences of discrimination increase the odds of being obese (OR = 1.17, p < .05). Worship attendance was positively associated with all health behaviors, except for obesity. With a significant interaction, worship attendance moderates the association between discrimination and binge drinking but no moderation exists for any other health behaviors. Those who report experiencing discrimination at least

sometimes and attend worship are more likely to report binge drinking in the past 30 days.

The multivariate analysis also indicated that females and older adults were significantly less likely to be current smokers, binge drinkers, and obese. Latinos and Blacks were significantly more likely and Asians were less likely to be obese when compared with NH Whites. Compared with those who have a bachelor's degree or higher, those with a high school degree or less had worse health behaviors. Those reporting no neighborhood social support were more likely to smoke and be obese and less likely to walk. Immigrants had better health behaviors compared with nonimmigrants, controlling on other covariates.

Discussion

This article examined the potential moderating influence of worship attendance on the association between discrimination and four health behavioral outcomes: current smoking status, binge drinking, walking, and being obese. Controlling on sociodemographic characteristics, those who report that they frequently experienced discrimination were more likely to smoke, binge drink, and be obese. These findings are consistent with other studies, suggesting that discrimination increases negative coping behaviors (Borrell et al., 2010; Krieger, 2000; Shariff-Marco et al., 2010; Williams et al., 2003).

Worship attendance was negatively associated with smoking and drinking, and positively associated with walking. Worship attendance was not associated with obesity. These findings confirmed our first hypothesis that worship attendance is associated with healthier behaviors and are consistent with previous research suggesting that religious institutions may involve supportive factors that influence health behaviors (Ellison, 1998).

When all racial/ethnic groups were included in the same model, worship attendance had a positive association with all health behaviors, except for obesity. Confirming our second hypothesis, differences emerge when race/ethnicity is disaggregated. Worship attendance appears to benefit Whites and Latinos. Blacks who attend worship had reduced odds of

Table 3. Adjusted Odds Ratios From Logistics Regression Models Predicting Health Behaviors Among All Racial/Ethnic Groups, California Health Interview Survey, 2003 (CHIS, 2010), *n* = 41,873.

Independent Variables	Current Smoker AOR (95% CI)	Binge Drinker AOR (95% CI)	Walks for Leisure/Exercise AOR (95% CI)	Obese AOR (95% CI)
Discrimination at least sometimes	1.26** (1.10, 1.43)	1.09 (0.96, 1.24)	1.03 (0.93, 1.14)	1.17* (1.04, 1.31)
Attends worship	0.53** (0.48, 0.59)	0.50** (0.46, 0.56)	1.22** (1.14, 1.31)	1.02 (0.94, 1.11)
Worship x Discrimination	1.13 (0.91, 1.39)	1.35* (1.09, 1.67)	1.09 (0.96, 1.23)	0.97 (0.82, 1.15)
Gender				
Male (Ref)	1.00	1.00	1.00	1.00
Female	0.58** (0.53, 0.62)	0.25** (0.23, 0.27)	1.21** (1.15, 1.27)	0.89* (0.83, 0.96)
Age (in years)				
18-24	0.85* (0.73, 0.99)	2.18** (1.88, 2.54)	0.99 (0.89, 1.06)	0.33** (0.29, 0.38)
25-39	1.15* (1.05, 1.26)	1.80** (1.63, 2.00)	1.06 (0.99, 1.13)	0.70** (0.65, 0.77)
40-64 (Ref)	1.00	1.00	1.00	1.00
65+	0.39** (0.35, 0.44)	0.31** (0.26, 0.37)	0.94 (0.88, 1.00)	0.65** (0.59, 0.71)
Race/Ethnicity				
White, NH (Ref)	1.00	1.00	1.00	1.00
Latino	0.49** (0.43, 0.56)	0.97 (0.86, 1.10)	0.98 (0.90, 1.06)	1.64** (1.49, 1.80)
Black, NH	0.86 (0.72, 1.02)	0.50** (0.40, 0.62)	0.73** (0.65, 0.81)	1.64** (1.43, 1.87)
Asian, NH	0.89 (0.75, 1.07)	0.71** (0.59, 0.86)	0.76** (0.67, 0.85)	0.44** (0.37, 0.52)
Other, NH[a]	1.35* (1.11, 1.65)	1.00 (0.79, 1.26)	0.99 (0.86, 1.14)	1.24* (1.04, 1.49)
Education				
Less than high school	2.97** (2.56, 3.45)	1.29* (1.10, 1.50)	0.60** (0.54, 0.67)	1.99** (1.77, 2.22)
High school diploma/some college/AA or AS degree	2.29** (2.08, 2.53)	1.14* (1.04, 1.26)	0.75** (0.70, 0.80)	1.69** (1.56, 1.84)
BA/BS or more (Ref)	1.00	1.00	1.00	1.00
Poverty level				
0-99% FPL	1.42** (1.23, 1.63)	0.82* (0.70, 0.94)	0.76* (0.69, 0.83)	1.25* (1.09, 1.43)
100-199% FPL	1.43** (1.25, 1.63)	0.84* (0.72, 0.98)	0.77* (0.71, 0.83)	1.26* (1.14, 1.39)
200-299% FPL	1.27** (1.12, 1.45)	0.82* (0.72, 0.94)	0.78* (0.71, 0.86)	1.12 (0.99, 1.26)
300% FPL and above (Ref)	1.00	1.00	1.00	1.00
Currently insured				
Yes (Ref)	1.00	1.00	1.00	1.00
No	1.44** (1.28, 1.62)	1.34** (1.17, 1.52)	1.02 (0.93, 1.13)	0.90* (0.82, 0.99)
Immigration status				
U.S. born (Ref)	1.00	1.00	1.00	1.00
Naturalized citizen	0.77** (0.67, 0.88)	0.72** (0.62, 0.84)	1.17* (1.07, 1.27)	0.68** (0.61, 0.76)
Noncitizen	0.66** (0.57, 0.76)	0.74** (0.62, 0.86)	1.13* (1.02, 1.25)	0.64** (0.56, 0.74)
People in neighborhood willing to help				
Agree (Ref)	1.00	1.00	1.00	1.00
Disagree	1.43** (1.28, 1.58)	0.96 (0.85, 1.09)	0.78** (0.71, 0.86)	1.18** (1.07, 1.29)

Note. AOR = adjusted odds ratio; FPL = federal poverty level; NH = non-Hispanic; Ref = reference.
[a]Other race includes American Indian/Alaska Native, Native Hawaiian, and other one race or two+ race.
*p < .05. **p < .01.

being smokers while worship attendance among Asians increased the odds for walking. More research is needed to understand how these variations may result from religious and denominational affiliation type as well as cultural differences. Findings were not as clear for obesity. In adjusted models, discrimination remained a significant predictor while worship attendance had no association with obesity. Although the 2003 CHIS did not include questions on diet, future analysis would benefit from a more comprehensive measure, including nutritional intake.

For all Californians, after controlling for covariates, the final models suggest that worship attendance was positively associated with multiple health behaviors, whether or not discrimination occurred. The only exception was for binge drinking in which the interaction term was significant, partially confirming our final hypothesis. Controlling on other covariates, those who experience discrimination at least sometimes and attend worship are more likely to binge drink. Research is needed to identify why this particular behavior had a significant and positive association, and whether worship attendance has a moderating association among other racial/ethnic groups not captured in this analysis.

Our findings suggest that religious institutions offer something unique beyond traditionally used predictors of health

behaviors, such as insurance and educational status. This analysis also indicated that social support in the individual's neighborhood was a strong indicator of health behaviors.[2] Determining which factors of worship attendance are most relevant in shaping health behaviors, such as the religious service itself, social support, or expectations enforced by the institution should be the focus of future studies. Using a more comprehensive measure of religious involvement and support may help clarify these mechanisms.

Limitations

There are several limitations to this analysis. First, the 2003 CHIS was the only year that both a religion question and discrimination question were administered. Second, the way in which CHIS asked about religious attendance (in the past 7 days) could bias results. Although survey administration took place over a 1-year period, responses to this question could vary depending on what time of year the survey was administered. For instance, the individual may have never attended worship during the year, but responded "yes" to the question because of a religious holiday in the past 7 days. Additionally, the 2003 CHIS only had one question that assessed religion, through worship attendance. Finally, because of the 2003 CHIS being cross-sectional, we are unable to determine whether exposure to worship occurred prior to the behaviors of interest or vice versa.

Issues related to the measurement of other constructs are worth noting. The racial/ethnic discrimination variable was operationalized with one question. Additionally, the walking variable does not adequately operationalize "exercise," as walking for leisure or exercise for at least 10 minutes in the past 7 days is a relatively low threshold. Also, BMI was based on self-reported weight and height. The BMI indicator, particularly among Asians has also not been fully validated (Lear, Humphries, Kohli, & Birmingham, 2007). A final limitation is that this study may overestimate the association of religion on health because of the large sample and relatively low response rate.

Despite these limitations, the study is strengthened by its diverse sample; in particular, the large number of Asian and Latino respondents who were interviewed in their native languages. Although population characteristics, state policies, and religious institutions may vary across the United States, a significant strength of this study is that it includes populations not integrated in many other studies. These results in large part support previous research (Bierman, 2006), which suggest that religious institutions provide something unique and supportive to all attendees.

Conclusion

Overall, while racial and ethnic discrimination increases the risk of poor health behaviors, religious attendance has a positive relationship on health behaviors among all groups.

This is a promising finding for those interested in reducing health disparities (Campbell, Hudson, Resnicow, et al., 2007), as a substantial portion of the population continues to be involved in religious institutions (Hadaway, 1993). Recent estimates suggest that 40% of the U.S. population reports attending worship services weekly, an estimate that has been relatively stable since the 1970s (Pew Research Center, 2010). Estimates from the 2003 CHIS suggest that 38% of the population reported attending worship during the past week.

Future analysis should aim to determine the causal pathways by which discrimination is associated to each health behavior through worship attendance. In addition, more research is needed to clarify racial/ethnic health differences and the role of worship attendance, particularly among Asians. Places of worship provide educational, civic, and political influence and opportunities for their members (Botchwey, 2007; Chatters, 2000). Given the promising findings in this analysis, policy makers, researchers, places of worship, and communities should continue to ascertain which dimensions of worship are most strongly associated with positive health behaviors and outcomes and develop possible interventions to address at-risk groups.

Notes

1. More information on California Health Interview Survey (CHIS) methodology is available at http://www.chis.ucla.edu.
2. This supports research that has shown associations between social capital and health (Kawachi et al., 2008); CHIS 2003 does not contain data that would adequately allow us to test this. Future research should investigate the interactions among social capital, worship attendance, and health.

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