Religion and Cognitive Functioning: Race-Ethnicity and Gender Differences in Older Adults.

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Abstract

Clear disparities in cognitive functioning among older adults exist. Surprisingly little work at the intersections of race-ethnicity and gender and cognitive functioning has been investigated. Religion and spirituality are clearly important to aging adults and may play a positive role in maintaining healthy cognition, particularly among Black women. Using data from the Health and Retirement Study, a large, nationally representative sample of US adults aged 50 and older including oversamples of African Americans and Latinos, we seek to expand our current knowledge on the relationship between religion and cognition in two important ways. First, we explore whether the association between various dimensions of religious involvement and cognition varies by race-ethnicity and gender. Second, we examine the extent to which several psychosocial mechanisms, including purpose in life and self-mastery, explain the association between religion and cognitive functioning among older adults. Results suggest that infrequent religious attendance as well as religiosity are inversely related to cognitive functioning among older adults. However, among older Black women, religiosity is associated with better cognitive functioning, and the relationship remains significant even once psychosocial mediators are included. The results highlight the importance of investigating healthy aging, and potential health-protective resources, at various complex social positions.

INTRODUCTION

A considerable body of research on race-ethnic differences in cognitive functioning finds that older minority adults have worse cognitive functioning compared with non-Hispanic whites (NHWs), but do not exhibit significantly greater rates of cognitive decline with age (Karlamangla et al., 2009, Masel and Peek, 2009, Castora-Binkley et al., 2013, Early et al., 13). For example, recent estimates suggest that roughly 24% of blacks aged 65 and older are cognitively impaired compared to only 9% of whites (Alzheimer's Association 2010). Findings on gender differences in older adults' cognitive function remain mixed and largely dependent on measures and methodology (Hyde 2016). There is, however, clear evidence that Alzheimer's disease (AD) and associated dementias disproportionately affect women, and additional research on the causes and consequence is essential (Mazure and Swendsen 2016; Sinforiani et al. 2010). Surprisingly, little work has examined cognitive function among older adults at the intersections of race and gender. Such work remains a critical task for both theory and research. Additionally, understanding what social and cultural factors preserve cognitive functioning at multiple axes of social stratification (i.e., race and gender) is essential to in understanding and promoting healthy aging.

One important psychosocial resource may be religion. Several decades of work have documented the health-promoting effects of religiosity (Ellison and Levin 1998). For instance, religious involvement is positively associated with lower mortality and morbidity, as well as better psychological well-being (Hummer et al 2004; Stark and Maier 2008; Drevenstedt 1998). But, scholars have only just begun to explore the relationship between religion and cognition in aging adults (Hosseini, Chaurasia, Oremus 2017; Agli, Bailly and Ferrand 2014). Although there is some evidence to suggest that religious involvement is associated with better cognitive functioning, this body of work has several notable limitations. Most studies on religion and cognition: a) rely on a single measure of religious involvement, usually religious attendance (Hill et al. 2006; Van Ness 2003), which does not capture the multidimensional nature of religion b) use small-scale, regional samples (Hill et al. 2006; Van Ness 2003), limiting the generalizability of the findings to the broader U.S. population or c) ignore possible variations by race/ethnicity, gender, or their intersection in the relationship between religiosity and cognitive functioning. Finally, no studies to our knowledge have examined the psychosocial mechanisms linking religion to cognition.

Using a large, nationally representative sample of US adults aged 50 and older, including oversamples of African Americans and Latinos, we seek to expand our current knowledge on the relationship between religion and cognition in two important ways. First, we explore whether the association between various dimensions of religious involvement and cognition varies by race-ethnicity and gender. Second, we examine the extent to which several psychosocial mechanisms, including purpose in life and self-mastery, explain the association between religion and cognitive functioning among older adults.

COGNITIVE FUNCTION AND RACE AND GENDER

Cognitive functioning refers to the mental capacities involved in thinking, understanding, learning, remembering, problem solving and decision making. It is a fundamental part of an individual's ability to engage in activities, accomplish goals, and successfully navigate the world (Bunner 2005) and is a major outcome of interest among aging adults. Prior studies have documented large disparities in healthy cognitive aging. Briefly, research finds a persistent racial gap in cognitive functioning, such that older blacks and Hispanics are more likely to suffer from cognitive impairment than their white counterparts (Zhang et al. 2016; Benn et al. 2015; Zahodne et al. 2016). Although the results on gender and cognition remain inconclusive, several studies suggest older women are more likely to be burdened with diseases associated with cognitive impairment (Mazure and Swendsen 2016; Sinforiani et al. 2010; Hyde 2016). Little research has examined cognitive function at the intersections of race-ethnicity and gender among older adults. One exception is a recent study by Diaz-Venegas (2016) and colleagues, which found older women have higher average cognitive scores than their male counterparts, but gender differences were

greater between Whites and Blacks compared with Hispanics and individuals who identified as some other race. These findings suggest examination of cognitive functioning among older adults should attend to the intersections of gender and race-ethnicity.

What is clear is that social position shape differential opportunities as well as differential exposure to conditions that impact a variety of health outcomes, including healthy cognitive aging. For example, inequalities in education (i.e., quality and quantity) and race-specific mechanisms (i.e., discrimination) may help explain the racial gap in cognitive functioning among older Black Americans (Zhang et al. 2016; Benn et al. 2015). Biological processes (i.e., hormonal declines) as well as inequalities in structural opportunities (i.e., less education) may help explain differences by gender among older adults. The accumulation of social (dis)advantage across the life course plays an important role in cognitive aging (Glymour and Manly 2008), and such factors may contribute to disparities by race and gender (Zsembik and Peek 2001; Sloan and Wang 2005; Brewster et al. 2014).

RELIGION AND COGNITIVE FUNCTIONING

Religion, best considered a multidimensional construct including organizational (i.e., attendance) and non-organizational (i.e., prayer and coping) factors (Levin et al. 1996), is thought to influence cognition through several mechanisms. Organized religious participation, generally measured via religious attendance, has been the most widely studied (Coin et al. 2010; Corsentino et al. 2009; Hill et al. 2006; Koenig et al. 2004; Van Ness and Kasl 2003; Yeager et al. 2006). These studies find that individuals who regularly participate in religious services have better cognitive functioning compared to individuals who attend less frequently. For example, using longitudinal data from the New Haven Established Populations for the Epidemiologic Studies of the Elderly (EPESE), Van Ness and Kasl (2003) found that individuals who attended religious services once a week or more experienced less cognitive decline 3 years later than those who attended less than once a week. This relationship remained significant even after controlling for other forms of social engagement.

Religious participation may affect cognitive decline in a number of ways. First, participation in religious involvement may reduce engagement in risky health behaviors, such as smoking and heaving drinking, related to cognitive decline. Second, the social elements of organized religious involvement may promote mental and social stimulation. Organized religious participation offers fertile ground for the cultivation of friendships and support (Ellison and George 1994; Bradley 1995), including both formal (i.e., pastoral counseling, small group meetings) and informal (i.e., socio-emotional support) support and services. Indeed, social isolation and loneliness are major risk factors for cognitive decline (Wilson et al. 2007; Cacioppo and Hawkley 2009). Additionally, regular participation in organized religious services may offer opportunities for increased sensory stimulation via engagement in prayer, scripture reading, singing, sermons, and philosophical discussions. Such activities may help build cognitive reserve capacity that delays the manifestation of cognitive difficulties (Hill et al. 2006).

A third important mechanism may involve various religious coping practices. Religious coping, also conceptualized as a multidimensional construct, may involve the use of religious cognitions and behaviors, including private prayer, religious support and guidance (Taylor, Chatters and Levin 2004; Paragment 1997; Pargament et al. 1990) that reduces psychological stressors, such as anxiety and depression. Such emotional states may negatively affect memory areas of the brain through physiological changes like elevated blood cortisol that increase one's risk for cognitive impairment (REF). For example, through prayer, individuals may develop a close, personal relationship with God (or a divine other), who offers comfort and solace during difficult times (Pollner 1989; Kirkpatrick 2004). Such activities may cultivate a belief of being a "child of God" that results in feelings of dignity and worth that may alter the perception, experience, and reaction to stressful events (Cooper-Lewter and Mitchell 1986)., Research has found that people often turn to prayer during highly intense negative emotional states, such as grief, anger or fear (Ai et al. 2007; Cowchock et al. 2011) and scholars have demonstrated how prayer

helps alleviate such feelings (Lambert and Dollahite 2006; Lambert, Fincham, Stillman, Graham, and Beach 2010). Religious beliefs, values and coping strategies may also produce meaning and purpose, which according to Koenig (2012) may guard against cognitive decline because it results in higher cortical functions related to abstract thinking.

Salient social identities may directly influence the understanding and expression of religion's cultural toolkit (e.g., strategies, behaviors, and practices) (Edgell and Tranby 2007; Baker 2008; Edgell 2017). Women in the U.S. tend to be are more religious than men (Beit-Hallahmi and Argyle 1997; Francis 1997; Walter and Davie 1998) and Blacks report higher levels of religious belief and practice and receive more support from their involvement in religious organizations than Whites (Chatters et al. 2008; Krause 2002; Taylor et al. 2004; Krause 2002; Taylor et al. 2000; Neighbors, Musick and Williams 1998). This work finds distinctive health benefits to church-based support for Black adults, including lower levels of depression (Taylor et al. 2004; Chapman and Steger 2010) and higher rates of self-esteem (Krause 2003; Ellison, 1993). Although much of the work on religion and health among Hispanics is still in its infancy, several studies suggest that religion serves as a salient protective influence on a number of health behaviors among this population (Garisa, Ellison, Sunsil, and Hill 2013). Additionally, a growing body of research highlights the salient role of religion and spirituality in facilitating health at the intersections of gender and race, particularly among women of color (Musgrave et al. 2002). For example, in a community sample of elderly minority women, religion and spirituality were prominently cited as facilitating mental well-being (Zhan et al. 1998). Among Black women, prayer, scripture reading, and the church community were resources used to meet daily needs (Miller 1995; Musgrave et al. 2002). Many Black women rely on religious coping strategies, including collaborative-coping and prayer, as health-protective behaviors even in the face of chronic stress (Wilson-Ford 1992; Musgrave et al. 2002; Levin and Taylor 1993). For these reasons, we may expect religion to "work" differently in shaping health outcomes by race-ethnic/gender subgroups. (Levin and Ellison 1998).

PSYCHOSOCIAL MEDIATORS

There are several salient mediators through which religion may affect cognitive functioning (Chatters 2000; Ellison and Levin 1998; Levin and Vanderpool,1991; Oman and Thoresen, 2002), including coherence (i.e., sense of meaning that reduces feelings of helplessness and increases optimism) as well as providing a sense of control and positive affect (e.g., love and forgiveness) that enables individuals to cope with stress (McIntosh and Spilka1990). Indeed, findings from several studies indicate that religious beliefs supply a greater sense of meaning and purpose in life (Chamberlain and Zika 1992; Frazier 2005; Park 2005), while also promoting higher rates of self-esteem (Ellison 1993). To advance the work of religion and cognition among older adults, the present study also includes several psychosocial mechanisms thought to explain the religion-health connection, including (a) purpose in life; (b) optimism; (c) hopelessness; (d) mastery; and (e) constraints.

DATA AND MEASURES

We use the Health and Retirement Study (HRS), an ongoing nationally representative study of older Americans, to examine the association between religion and cognition. In 2006, the HRS began collecting data on psychosocial characteristics using a self-administered questionnaire (SAQ). The SAQ obtains information about participants' evaluations of their life circumstances, subjective well-being, and lifestyle. A random half-sample of households received the SAQ in 2006 and the second half-sample received it in 2008. Follow-up assessments occur every 4 years (i.e., 2010 and 2012, respectively) and a new sub-sample of individuals born between 1954 and 1959 (i.e., Mid Baby Boomer (MBB)) was added in 2010. The MBB also includes a racial/ethnic minority oversample in order to boost the size of the minority samples in those cohorts. In order to take advantage of these minority oversamples, we use the 2010/2012 sample. The final analytic sample includes 11,628 adults born in 1954 or earlier with complete data on all demographic, socioeconomic, psychosocial and health measures.

Cognitive function. The HRS uses a modified version of the Telephone Instrument for Cognitive Status or TICS to assess cognitive function both in face-to-face interviews and by telephone. We constructed a total cognitive function score by summing scores across the following tests of memory and mental status: (a) an immediate word recall test in which respondents are read a list of 10 common nouns and are immediately asked to repeat as many words from the list as they can recall (10 points); (b) a delayed recall test, occurring approximately 5 minutes later, of the same 10 words (10 points); (c) a serial 7's subtraction test requiring respondents to subtract 7 from 100 five times (5 points); (d) a backwards counting test requiring respondents to count backwards as quickly as possible for 10 continuous numbers from the number 20 (2 points if correct on first attempt, 1 point if correct on second attempt); (e) naming the day of the week and the date (4 points); (f) naming the president and vice-president (2 points); and (g) identifying two objects, 'scissors' and 'cactus' (2 points). The total cognitive function score was normally distributed and values ranged from 0 to 35, with higher scores reflecting higher cognitive functioning.

Religion. We assessed two indicators of religious involvement: frequency of religious attendance and religiosity. First, religious attendance was measured by asking the respondent, "How often do you attend religious services?" Original response categories ranged from 1="daily" to 5= "less often than that," however responses changed across waves, and for consistence we collapsed responses as: never attend services, infrequently attend services (once a month), and frequently attend services (i.e., daily or weekly attendance), which serves as the reference category. Religiosity, a 4-item scale capturing religious beliefs, values, and coping, includes: (1) "I believe in a God who watches over me"; (2) "Events in my life unfold according to a divine or greater plan"; (3) "I try hard to carry my religious beliefs over into all my other dealings in life"; and (4) "I find strength and comfort in my religion". Responses ranged from 1= "Strongly disagree" to 6 = "Strongly agree". Items were summed so that higher scores reflect higher levels of religiosity (Alpha=.92).

Mediators. We include several theoretically driven psychosocial mediators of the religion-health relationship (Chatters 2000; Ellison and Levin 1998; Levin and Vanderpool 1991; Oman and Thoresen 2002), including: (a) *purpose in life*, a 7-item index, measuring the respondents (dis)agreement with such items as "I have a sense of direction and purpose in my life," and "I enjoy making plans for the future and working to make them a reality" (Keyes et al. 2002; Ryff and Keyes 1995; alpha =.77); (b) *hopelessness*, a 4-item index, assessed via the respondents (dis)agreement with questions like "I feel it is impossible for me to reach the goals that I would like to strive for" and "I don't expect to get what I really want" (Beck et al. 1974; Everson et al. 1997; alpha=.86); (c) *optimism*, measured via six questions, including "If something can go wrong for me it will", and "In uncertain times, I usually expect the best" (Scheier et al.1994; alpha=.75); (d) *mastery*, measured via the Pearlin and Schooler's (1978) perceived mastery index, which includes five items like: "I can do just about anything I really set my mind to" and "What happens to me in the future mostly depends on me;" (Alpha=.90); and (e) *constraints*, a 5-item scale, including items like "I often feel helpless in dealing with the problems of life" and "I have little control over the things that happen to me." (Lachman and Weaver 1998; alpha=.86). Items were reverse coded where necessary so that higher scores on all scales reflect higher psychosocial mediators.

Controls. We constructed a series of dichotomous variables by race-ethnic and gender subgroups (i.e., White men, White women, Black men, Black women, Hispanic men, Hispanic women). The analyses also controlled for several background factors that are known or suspected correlates of the dependent and independent variables, and therefore could confound the associations of interest in this study. The factors include: age (in years); relationship status (married, divorced/separated, widowed, and unmarried); birth cohort (HRS, CODA, WB, EBB and MBB cohorts); education (less than high school, high school diploma/GED, some college, or a college degree or higher) and household income (logged dollars).

Analytical Strategy. The data analysis progressed in several steps. First, descriptive statistics of the study variables stratified by race and gender were produced and are displayed in Table 1. Second, we examined

the net effects of religious attendance and religiosity on cognitive functioning using ordinary least squares (OLS) regression. These results are presented in Model 1 in Table 2. Next, to examine the moderating effects of race/ethnicity/gender and religion, interaction terms were added to the full main effects OLS regression model (i.e., religion x race/gender). These results are presented in Model 2 in Table 2. Lastly, our psychosocial mediators were introduced in Model 3 in Table 2.

PRELIMINARY RESULTS

White women report the highest levels of cognitive functioning (mean=24.2), while Hispanic women report slightly lower mean cognitive function scores (mean=20.6). Among men, White men reported an average cognitive function score of 23.7, while Black and Hispanic men reported mean scores of 20.2 and 20.8 respectively. Black women report the highest levels of religiosity (mean=20.5) and 55.1% of Black women report frequent attendance (i.e., weekly, plus) at religious services. White men reported the lowest levels of religiosity (mean=17.6), while only 30.0% of White men reported frequently attending religious services.

The results presented in Model 1 of Table 1 suggest that net of covariates, religiosity is inversely related to cognitive functioning. That is, for every unit increase in religiosity, cognitive functioning decreases by .03 ($p<.05$) among older adults. However, consistent with previous research, the results for religious attendance suggest an opposite effect. Compared to those who frequently attend religious services, older adults who never attend religious services report significantly lower levels of cognitive functioning (b=-.54, p=.05), net of covariates.

Turning to the moderating effects of race and gender, we find religiosity is positively associated with cognitive functioning among older Black women, compared to older White men net of covariates (Model 2). Figure 1 is the graphic representation of the predicted cognition scores from Model 2 by race/sex and religiosity keeping the remining covariates at their mean. Figure 1 reveals relatively flat lines for the association between religion and cognitive functioning for White men and women and Black men. However, results from Model 2 suggest that religiosity is inversely related to cognitive functioning among White men (b=<.06, $p<.05$) and none of the other race/sex subgroups differ significantly from White men. However, among Black women, as religiosity increases, cognitive functioning increases (b=.13, $p<.05$). No significant interactions by race and gender and religious attendance were found (not shown).

With the inclusion of our mediators the relationship between religion and cognition is reduced slightly for Black women, but remains statistically significant (Model 2 b=.13, $p<.05$ vs. Model 3 b=.11, $p<.05$). The psychosocial mechanisms explain approximately 15% of the association between religion and cognitive functioning among this group. The results presented in Model 3, also suggest several of our psychosocial mechanisms have an independent effect on cognitive functioning among older adults. Specifically, purpose in life and optimism is positively associated with cognitive function among older adults, while perceived constraints are inversely associated with older adults' cognitive functioning.

Plans for future analysis. Once the 2016 wave of the HRS is released, we will conduct a lagged model, controlling for cognitive functioning in 2010/2012.

References available upon request.

Table 1: Characteristics of HRS Leave Behind 2010-12 Sample, Weighted estimates (n=11,628)

	White Men n=3,671 Mean (SE) or %	White Women n=4,957 Mean (SE) or %	Black Men n=610 Mean (SE) or %	Black Women n=1,249 Mean (SE) or %	Hispanic Men n=470 Mean (SE) or %	Hispanic Women n=671 Mean (SE) or %
Cognitive functioning	23.7 (0.08)	24.2 (0.08)	20.2 (0.26)	20.6 (0.19)	20.8 (0.28)	20.5 (0.26)
Religiosity	17.6 (0.13)	19.7 (0.10)	20.5 (0.32)	22.0 (0.15)	19.7 (0.30)	20.7 (0.27)
Church attendance						
Not at all	34.2%	27.2%	19.4%	11.4%	24.7%	17.3%
Infrequent	35.8%	35.0%	40.0%	33.5%	45.1%	36.7%
Frequent	30.0%	37.8%	40.6%	55.1%	30.2%	46.0%
Demographics						
Age	64.4 (0.17)	65.8 (0.17)	62.2 (0.42)	63.7 (0.37)	61.7 (0.45)	63.0 (0.44)
Marital status						
Married	73.3%	57.7%	51.2%	29.8%	65.0%	49.7%
Unmarried	11.0%	8.0%	23.3%	21.1%	14.8%	11.1%
Separated/divorced	11.0%	14.4%	20.2%	27.3%	16.8%	22.1%
Widowed	4.8%	19.8%	5.3%	21.8%	3.4%	17.1%
Cohort						
AHEAD	2.4%	4.3%	1.2%	2.9%	1.2%	1.7%
CODA	6.5%	8.7%	3.9%	5.7%	2.5%	3.8%
HRS	19.7%	20.6%	16.9%	17.2%	15.3%	17.7%
War Babies	18.3%	18.1%	14.5%	16.0%	14.8%	17.1%
Early Boomers	25.5%	22.8%	27.1%	25.7%	29.2%	25.0%
Mid Boomers	27.5%	25.4%	36.4%	32.5%	37.0%	34.8%
Education						
< High school	7.7%	7.9%	25.2%	23.8%	38.3%	44.3%
HS graduate or GED	31.2%	35.8%	34.2%	31.9%	28.7%	27.1%
Some college	24.9%	27.9%	27.0%	29.2%	18.7%	18.5%
College and above	36.1%	28.4%	13.6%	15.0%	14.3%	10.2%
Household income (logged)	11.0 (0.02)	10.8 (0.02)	10.0 (0.12)	9.8 (0.08)	10.1 (0.11)	9.6 (0.13)
Mediators						
Purpose in life	32.4 (0.13)	32.4 (0.11)	33.2 (0.35)	33.4 (0.23)	31.5 (0.38)	31.4 (0.36)
Hopelessness	9.2 (0.10)	8.8 (0.08)	9.8 (0.28)	9.3 (0.20)	10.6 (0.33)	10.4 (0.28)
Optimism	26.6 (0.12)	27.3 (0.10)	25.8 (0.27)	26.4 (0.21)	25.8 (0.36)	25.8 (0.29)
Mastery	23.8 (0.10)	23.7 (0.09)	23.7 (0.30)	23.6 (0.20)	24.7 (0.32)	23.5 (0.33)
Constraints	10.4 (0.11)	10.6 (0.10)	11.3 (0.31)	11.1 (0.22)	11.6 (0.36)	12.0 (0.32)

Table 2: Weighted linear regression models predicting cognitive functioning in 2010/12 by religiosity and race/gender

	Model 1 b (SE)	Model 2 b (SE)	Model 3 b (SE)
Religiosity	-0.03 (0.01)*	-0.05 (0.01)*	-0.06 (0.01)*
Church attendance (Ref=frequent)			
Not at all	-0.54 (0.12)*	-0.57(0.12)*	-0.42 (0.12)*
Infrequent	-0.15 (0.10)	-0.16 (0.10)	-0.05 (0.10)
Race/ethnicity & gender (Ref = White men)			
White women	1.04 (0.09)*	0.61 (0.29)*	0.49 (0.28)
Black men	-2.47 (0.22)*	-2.84 (0.94)*	-2.95 (0.94)*
Black women	-1.83 (0.17)*	-4.51 (0.88)*	-4.37 (0.83)*
Hispanic men	-1.51 (0.26)*	-3.13 (0.99)*	-3.00 (0.95)*
Hispanic women	-1.22 (0.24)*	-2.54 (0.98)*	-2.57 (1.06)*
Interactions			
White women x Religiosity		0.02 (0.01)	0.03 (0.01)
Black men x Religiosity		0.02 (0.04)	0.02 (0.04)
Black women x Religiosity		0.13 (0.04)*	0.11 (0.04)*
Hispanic men x Religiosity		0.08 (0.05)	0.08 (0.05)
Hispanic women x Religiosity		0.07 (0.05)	0.07 (0.05)
Mediators			
Purpose in life			0.03 (0.01)*
Hopelessness			-0.02 (0.01)
Optimism			0.04 (0.01)*
Mastery			0.01 (0.01)
Constraints			-0.05 (0.01)*
Intercept	31.25 (1.36)*	31.66 (1.37)*	30.76 (1.39)*
# of respondents		n=11,628	

Notes: *p<.05; **p<.01; ***p<.001

Figure 1: Predicted Cognitive Functioning by Religiosity, Race/Ethnicity, Gender, Model 2