Published in final edited form as:

Aging Ment Health. 2009 November ; 13(6): 788–798. doi:10.1080/13607860903046446.

The relationship between religiosity and health behaviors in female caregivers of older adults with dementia

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Abstract

The current study explored the relationship between three dimensions of religiosity: (a) organizational religiosity (e.g. attendance at religious events), (b) non-organizational religiosity (e.g. prayer), and (c) subjective religiosity (e.g. importance of religion) and caregiver health behavior patterns in a sample of Latina and Caucasian female caregivers of older adult relatives with dementia. It was hypothesized that religiosity would have a significant association with reduced cumulative health risk as determined by an index of health behaviors. It was also hypothesized that, when examining the individual health behaviors subsumed in the overarching index, religiosity would be positively associated with adaptive health behaviors like exercise and negatively associated with health risk behaviors like smoking. Amongst Caucasians, increased subjective religiosity was related to increased cumulative health risk. Conversely, in Latinas, non-organizational religiosity was positively correlated with improved dietary practices (reduced dietary restriction). Increased levels of subjective religiosity were significantly associated with decreased maintenance of a routine exercise regimen across ethnic groups. Recommendations for clinicians and religious leaders, and avenues of future research are discussed.

Keywords

caregiver; health behaviors; religiosity; Alzheimer's disease; stress/burden; physical health measures

Introduction

The burden of care for dementia patients is often placed on immediate family members. These caregivers can experience considerable psychological and physical strain as a consequence of their caregiving roles (Pinquart & Sorensen, 2003; Schulz, O'Brien, Bookwala, & Fleissner, 1995; Vitaliano, Schulz, Kiecolt-Glaser, & Grant, 1997). Caregivers who become distressed or whose physical health worsens may be unable to care appropriately for their relative, and may be forced to consider institutionalization (Aneshensel, Pearlin, & Schuler, 1993; Cohen et al., 1990; Morycz, 1985; Zarit, Reever, & Bach-Peterson, 1980). Thus, identifying caregiver resources which may intervene in the

pathway between caregiver stress and health decline is an important public health undertaking.

Although some findings have been equivocal (Baumgarten et al., 1992), a growing body of literature suggests that caregiving may have an adverse impact on caregiver health behaviors (Burton, Newsom, Schulz, Hirsch, & German, 1997; Connell, 1994; Connell, Janevic, & Gallant, 2001; Gallant & Connell, 1997, 1998). Not only are poor caregiver health behaviors problematic for the caregivers, but also they may undermine a caregiver's ability to adequately care for his/her loved ones and may increase rates of institutionalization of the care recipient (Cohen et al., 1993; Harper & Lund, 1990; Lieberman & Kramer, 1991; McFall & Miller, 1992). Thus, to help enhance both caregiver and care recipient well-being, it is essential to identify caregiver resources that reduce health risk behaviors and promote the use of positive health behaviors.

For many individuals, religion provides a unifying framework for interpreting, identifying meaning in, and coping with difficult life experiences like caregiving (Stolley, Buckwalter, & Koenig, 1999; Tix & Frazier, 1998). Numerous studies, conducted with different populations, indicate that religious individuals evidence a range of physical and mental health benefits (Seybold & Hill, 2001; Townsend, Kladder, Ayele & Mulligan, 2002). However, rather than a direct relationship between religion and health, some have suggested that religion indirectly affects one's health through the promotion of positive health behaviors (e.g., healthy eating and exercise) and restriction of negative health behaviors (e.g., smoking and drug use; Ellison & Levin, 1998), making the relationship between religiosity and health behaviors a worthy target of study. Religious communities and/or one's adherence to religious doctrine may effectively encourage activities that promote physical and mental health or attenuate similarly unhealthy and risky behaviors. The present study examines the extent to which religiosity is predictive of health behavior patterns in female caregivers of older adults with dementia.

Traditionally, research that examined the relationship between religion and health focused on public or organizationally based religious behaviors (e.g., church membership, church attendance, and involvement in church activities). Unfortunately, an exclusive focus on public religious participation may only account for a single facet of an individual's personal experience with religion. Indeed, private religious practices may be one of the most important and meaningful aspects of an individual's religious experience (Ellison, 1998), and the current literature suggests that religion in America has become increasingly individualized in recent years (Hill, Sarazin, Atkinson, Cousineau, & Hsu, 2003). Therefore, studies of religiosity must consider private manifestations of religion if they are to accurately reflect the nuances of the relationship between religiosity and other behaviors. This could be particularly true amongst caregivers for whom routine participation in organized religion may be compromised by the time and task demands inherent in the caregiving process. In short, to focus solely on public religious involvement may oversimplify what is likely a complex relationship between religiosity and health in dementia caregivers.

Chatters, Levin, and Taylor (1992) proposed a model of religiosity among older adults that incorporates three dimensions of religious involvement: (a) organizational religiosity (e.g., attendance at religious events), (b) non-organizational religiosity (e.g., prayer), and (c) subjective religiosity (e.g., importance of religion). Focusing on multiple dimensions of religiosity allows for a more comprehensive conceptualization of the relationship between religiosity and health behaviors in a caregiving population. Moreover, it permits differential comparisons to be made across dimensions of religiosity. Such comparisons are essential because some dimensions of religiosity may better predict health behaviors and outcomes

than others (McCullough, Hoyt, Larson, Koenig, & Thoresen, 2000). Alternatively, some dimensions of religiosity may actually be correlated with health decrements (Levin, Chatters, & Taylor, 1995). Therefore, parsing and studying the components of religious practice will help to identify elements that enhance, or conversely, detract from caregiver health.

The present study sought to elucidate the nature of the relationship between dimensions of religiosity and health behaviors amongst Latinas and Caucasian caregivers of elderly relatives with dementia. It was hypothesized that each of the aforementioned dimensions of religiosity: (a) subjective, (b) nonorganizational, and (c) organizational, would be associated with improved health behavior patterns in a sample of Latin and Caucasian female caregivers of older adult relatives with Alzheimer's dementia. A cumulative health risk index, along with the individual health behaviors subsumed in the index, were included in the analyses. Because the literature also suggests that Latinas and Caucasians differ in their levels and expression of religiosity (Mausbach, Coon, Cardenas, & Thompson, 2003), moderator analyses were utilized to examine the possibility of an ethnically differential relationship between religiosity and health behavior patterns.

Methods

Participants

The current article presents site-specific data collected at baseline from the Palo Alto site of the National Institutes of Health's Resources for Enhancing Alzheimer's Caregiver Health (REACH) multi-site study. REACH is a unique 5-year initiative investigating the effectiveness of innovative interventions to support family caregivers. At the Palo Alto site, female family caregivers of older adults with significant memory problems were recruited from the community. Women were targeted for inclusion because prior research indicates significant gender differences in response to caregiving (reviewed in Lauderdale & Gallagher-Thompson, 2002). Special efforts were made to identify organizations within the Latino community. Key recruitment sites included local diagnostic centers, local Alzheimer's Association chapters, adult day care programs, Alzheimer's day care programs, caregiver resource centers, and local senior centers serving the Latino communities. Strategies included the establishment of a community advisory board, staff presentations on a variety of aging and caregiving topics at community agencies, and media advertisement in both Spanish and English. (For additional information on REACH recruitment and retention strategies, see Gallagher-Thompson et al., 2000; Wisniewski et al., 2003).

The national REACH project developed a standardized telephone-screening tool based on a common set of inclusion/exclusion criteria designed to identify an appropriately diverse, yet well-defined target population. Study participants had to be adult caregivers of at least 21 years of age who lived with, and provided four or more hours of care to, family members requiring assistance with at least two instrumental activities of daily living (IADL) or one activity of daily living (ADL) (Katz, Ford, Moskowitz, Jackson, & Jaffee, 1963; Lawton & Brody, 1969). Participants must have been in the caregiving role for at least 6 months, available by telephone, and planning to stay in the area for the study's duration. The care recipients needed to have either a physician's diagnosis of dementia or a recent Mini-Mental State Examination (MMSE) score less than or equal to 23 out of 30 (Folstein, M.E., Folstein, S.E., & McHugh, 1975). The majority of REACH sites added entry criteria relevant to site-specific hypotheses. In California, REACH caregivers also had to be female and self-identify as Anglo or Latina. For the care recipients, when a clinical diagnosis of dementia was not available, the results of baseline MMSE, ADL, IADL, and Revised Memory Behavior Problem Checklist (Teri et al., 1992) scores had to be consistent with a

diagnosis of dementia as determined by the project geropsychiatrist. Further details are available elsewhere (Wisniewski et al., 2003).

Measures

Demographics—Demographic data were gathered during the baseline interview. Data included caregiver age, years in US, primary racial/ethnic group identification (using census categories), years of formal education, and caregiver's relationship to care recipient.

Religiosity—Participants were assessed using single-item global religiosity measures (GRMs), which included the following three questions: (a) 'How often do you usually attend religious services, meetings and/or activities?' (i.e., organizational religiosity), 'How often do you pray or meditate?' (i.e., non-organizational religiosity), and 'How important is your spirituality or religious faith to you?' (i.e., subjective religiosity). Response options for frequency of attendance and prayer were: 1 = Never, 2 = Once a year, 3 = A few times a year, 4 = At least once a month, 5 = At least once a week, and 6 = Nearly every day. Response options for importance of religion were: 1 = Not important, 2 = Somewhat important, 3 = Important, and 4 = Very important.

Caregiver Health Behaviors—Five health behaviors (smoking, alcohol consumption, weight maintenance, exercise, and diet) were measured as part of the REACH baseline interview with items adapted from the Nutrition Screening Initiative (NSI), which was sponsored by the American Academy of Family Physicians and the American Dietetic Association (Posner, Jette, Smith, & Miller, 1993). Three items ('Do you eat fewer than two meals per day', 'Do you consume three or more alcoholic drinks per day', and 'Have you gained more than 10 pounds in the last 6 months') were taken directly from the NSI. Two additional items were added by the REACH coordinating center. The first addressed routine engagement in vigorous exercise, 'Do you do vigorous exercises for 15–30 min or more at least three times a week?' The second evaluated smoking habits, 'Do you smoke cigarettes now?' Responses to all five items were dichotomous (0= no, 1 = yes), and are summed to form a 5-point scale where 0 indicated low cumulative health risk and 5 indicated high cumulative risk. Exercise was reverse coded when creating the cumulative health risk scale in order to reflect it being a positive health behavior. This scale was previously used in a cross-site study from the National Reach project examining coping, appraisals, and well-being in Caucasian and Latina caregivers (Coon et al., 2004).

Care recipient memory and behavior problems—The Revised Memory and Behavior Problems Checklist (RMBPC) (Teri et al., 1992) was used to assess the type and number of disruptive behaviors exhibited by the care recipient. Caregivers were asked whether their care recipient manifested any 1 of the 24 behavior problems (7 memory, 8 depressive, and 9 disruptive) during the past week. A total score (CRMBP) was calculated by summing the number of 'yes' responses the caregiver provided (range = 0–24).

Care recipient activities and instrumental activities of daily living—The seven-item Activities of Daily Living Scale (Katz et al., 1963) was used to assess the level of help the care recipient required (at baseline) to bathe, dress above and below the waist, eat, use the toilet, groom, and transfer in and out of a bed or chair. The eight-item Instrumental Activities of Daily Living Scale (Lawton & Brody, 1969) assessed deficits in higher-level selfcare abilities such as the help needed to use the telephone, prepare meals, do housework, do the laundry, shop, take medications, travel, and manage finances. Response options for both ADL and IADL were dichotomous, with 0 = no help needed and 1 = yes, help needed. The number of 'yes' responses to the items on the two scales were summed independently to

yield two scores. ADL scores range from 0 to 6 and IADL scores range from 0 to 8 with higher scores indicating greater functional impairment for both.

Care recipient cognitive status—The care recipient's cognitive status was evaluated at baseline using the MMSE (Folstein et al., 1975), which ranges from 0 to 30, with lower scores indicating more impairment. The MMSE has well-documented reliability and validity for use with a variety of older adults in a number of settings (MacNeill & Lichtenberg, 1999). Cronbach's alpha for the current sample was 0.87. Caregivers were also asked to report how many years they had been caregiving for their care recipient and the number of hours per day they provided caregiving assistance.

Data analysis

Data Preparation—Data were inspected for missing values, multivariate outliers, variable distribution and skewness, and multicollinearity according to the procedures outlined by Tabachnick and Fidell (1986). Missing values analysis revealed that no variable had more than 1% missing values and non-significant results for Little MCAR's test $\chi^2 = 1.53$, $df = 7$, $p = 0.98$ revealed that data were missing completely at random. Multivariate outliers were assessed by calculating Mahalanobis distances for the multivariate residuals of all predictor variables (Tabachnick & Fidell, 1996). Using a conservative alpha of 0.001 for 9 degrees of freedom (determined by the number of study variables), any case with a Mahalanobis distance greater than a critical χ^2 value of 27.877 was considered a multivariate outlier. No cases met this criterion.

The distribution of data was evaluated by visual inspection and by calculating skewness statistics and standard errors. Skewness statistics were divided by the corresponding standard error in order to derive a z-score. A z-score of greater than 2.0 was considered to be an evidence of a skewed distribution. Nonorganizational and subjective religiosities were each negatively skewed and were transformed using logarithmic transformations with reflection. The transformed variables were subsequently multiplied by '−1' to maintain their original directionality.

Primary analysis

A multiple linear regression approach was used to test the a priori hypothesis that a significant relationship would exist between three constructs of religiosity and cumulative health risk associated with caregiver health behavior patterns. Prior to running the regressions, variance inflation factors (VIF) were examined for each study variable to assess for multicollinearity amongst the study variables. No VIF values exceeded 2.5 suggesting that multicollinearity levels were not unacceptably high (Allison, 1999).

All continuous predictor variables were centered at their means by subtracting the grand mean from each individual score in order to diminish potential problems resulting from multicollinearity while increasing both the precision of parameter estimation and the power of statistical testing of those parameters (Kraemer and Blasey, 2004). Ethnicity was contrast coded '0.5' and '−0.5'. To assess for potential moderating effects for ethnicity, three interaction terms were created by multiplying the dichotomously coded ethnicity variable by the centered religiosity variable (Holmbeck, 2002).

Ethnicity, the transformed and centered religiosity variables, and the new interaction terms were entered into the regression equation along with the covariates age and education, which are the two factors identified in the literature as being correlated with religiosity (Kendler, Gardner, & Prescott, 1999). Cumulative health risk served as the dependent variable. In this model, significant main effects would confirm that religiosity predicts cumulative health risk

associated with health behavior patterns, and significant interactions would provide evidence of a moderating effect for ethnicity on the relationship between religiosity and cumulative health risk.

Post hoc probing of primary analysis results

Post hoc probing to explore the nature of significant interactions was conducted according to the procedures outlined by Holmbeck (2002). This approach was utilized in lieu of visual inspection because a significant interaction does not afford insight into whether or not simple slopes at varying levels of the moderator variable are significantly different from zero, or from each other (Holmbeck, 2002). For post hoc probing of the moderation effect of ethnicity on religiosity, two new, conditional moderator variables were created. In one variable, one level of the moderator was coded '1' (Caucasians), and the other '0' (Latinas). In the second variable, the level coded '0' in the previous variable (Latinas) was coded '-1' and the other level was coded '0' (Caucasians). Both of these variables were multiplied by the religiosity variable to create new interaction terms. Two new regression equations were run in which the main effect, the new conditional moderator variable, and the new interaction term were regressed on cumulative health risk. The covariates of age and education were also included in the regressions. This produced significance test for the simple slopes of each level of the moderator.

Exploratory analyses

Exploratory analyses were conducted to ascertain the relationship between the three religiosity measures and the individual health behaviors subsumed in the cumulative health risk scale. Due to the dichotomous nature of the health behavior variables, binary logistic regression analysis was used. The distribution of data was evaluated for each health behavior variable in order to ensure that the data met requisite assumptions. The variable assessing drinking (i.e., drinking more than three drinks per day), was found to have an extremely skewed distribution of yes/no responses with only three participants endorsing the behavior which resulted in a cell frequency of less than five. Consequently, it was not included in the analysis.

Likewise, it has been recommended that the smaller of the classes of the dependent variable should have at least 10 events per parameter in the model (Peduzzi, Concato, Kemper, Holford, & Feinstein, 1996). Otherwise, the reliability of estimates decline when there are few cases for each observed combination of independent variables. This was the case with smoking, and thus it too was not included in the exploratory analyses.

The same independent variables and covariates used in the primary analyses were used in the exploratory analyses. The health behaviors with a reasonable distribution of yes/no responses served as the dependent variables: (a) dietary restriction, (b) weight gain, and (c) exercising. As in the primary analyses, significant interactions were evaluated according to the procedures delineated by Holmbeck (2002).

Results

Demographic and health characteristics

Descriptive statistics were calculated for demographic and study variables. Differences across ethnicity were calculated with t-tests for independent samples and χ^2 -tests for continuous and categorical variables, respectively. Results of these analyses and descriptive data are discussed further.

Demographic Characteristics—The mean age of the caregivers was 57 and the mean age of the care recipients was 78. On average, the sample of caregivers reported at least a high school education (mean = 12.39). Latina caregivers were younger (51.22 vs. 60.59; $t = 5.72$, $p < 0.001$), had fewer years of education (10.49 vs. 13.75, $t = 8.03$, $p < 0.001$), were more likely to be daughters ($t = 21.58$, $p = 0.001$), and resided in the US for fewer years (45.91 vs. 73.6; $t = 10.83$, $p < 0.001$). The average MMSE score for the care recipients in the sample was 21.38, and caregivers provided an average of 10.71 ADLs/IADLs per week to their loved ones. There were no significant differences between Caucasians and Latinos with regards to MMSE or ADLs/IADLs. A significant ethnic difference emerged in care recipient disruptive memory and behavior problems with Latinas reporting 12.13 per week and Caucasians reporting 10.81 ($t = -2.43$, $p = 0.02$). With regard to religiosity, statistically significant differences were observed between Caucasians and Latinas across all three domains assessed (subjective: $t = -3.18$, $p < 0.01$; non-organizational: $t = -4.04$, $p < 0.001$; organizational: $t = -5.22$, $p < 0.001$), with Latinas consistently reporting more religiosity than Caucasians (subjective: 3.60 vs. 3.22, non-organizational: 5.71 vs. 4.99; organizational: 4.04 vs. 3.0). Results of further analyses and descriptive data related to caregiver health and health behaviors are presented in Table 1.

Health characteristics

Participants reported themselves to be in good overall health and engaged in relatively few health-risk behaviors. In the sample, 64.91% of caregivers rated their health between good and excellent, 92.8% of caregivers did not smoke, 98.86% did not drink, and over 30% (32.2%) engaged in vigorous exercise at least twice a week. Of the caregivers, 38.6% reported having gained more than 10 pounds in the preceding 6 months and 15.15% reported eating fewer than two meals per day. Latina caregivers were significantly more likely to eat less than two meals per day, ($\chi^2 = 4.86$, $p = 0.02$) and experience recent weight gain ($\chi^2 = 6.42$, $p = 0.04$).

Overall, the sample reported few negative health conditions. However, 30.3% reported high blood pressure, 8.33% reported diabetes, and 14.02% reported a diagnosed heart condition. Only 4.6% of the caregivers had a history of a stroke. The low incidence of stroke may be attributable to the fact that the negative sequelae of a stroke may preclude an individual from assuming or persevering in the caregiver role. Caucasian caregivers had a significantly higher rate of heart conditions ($\chi^2 = 7.71$, $p = 0.02$) and cancer ($\chi^2 = 4.36$, $p = 0.04$), whereas Latinas were significantly more likely to have diabetes ($\chi^2 = 9.53$, $p < 0.01$).

Primary Analyses

Our primary analyses examined the relationship between three dimensions of religiosity and cumulative health risk associated with health behaviors patterns. Results of these regressions are given in Table 2. The overall model was significant ($F [264, 9] = 3.76$, $p < 0.001$) and accounted for 12% of the variance in cumulative health risk ($R^2 = 0.12$). After controlling for age and education, both of which significantly predicted cumulative health risk (age: $t = -3.36$, $p = 0.001$; education: $t = -2.06$, $p = 0.04$), a significant interaction was observed for the relationship between subjective religiosity and ethnicity ($t = 1.935$, $p = 0.05$). No main effects were observed for ethnicity or religiosity. Although conventional approaches would stipulate that interactions are typically not interpreted if there are no main effects for the variables that comprise the interaction term, we chose to interpret the interaction because the differential relationship between subjective religiosity and cumulative health risk across ethnicities was believed to be of importance to the literature. Additionally, the absence of significant main effects may be explained by examining the simple effects. Specifically, the directionality of the relationship between the independent variable and the dependent

variable were different across ethnicities with only one group exhibiting a significant simple effect (see further for more details).

Post hoc probing, conducted according to the procedures delineated by Holmbeck (2002), was utilized to examine the nature of the significant interaction between subjective religiosity and ethnicity. The findings revealed a significant moderator effect for ethnicity on the relationship between subjective religiosity and cumulative health risk. Amongst Caucasian caregivers, increased subjective religiosity was significantly associated with increased cumulative health risk ($t = 0.46$, $p = 0.03$), whereas for Latinas, a negative, but non-significant association between subjective religiosity and cumulative health risk was observed ($t = -0.16$, $p = 0.57$).

Exploratory Analyses

Logistic regression was utilized to explore the relationship between the three religiosity dimensions and the health behaviors subsumed in the cumulative health risk index. The analyses utilized only those health behaviors for which there were reasonable distributions of responses to permit appropriate statistical examination (dietary restriction, weight gain, and exercise). The results indicated significant relationships between health behaviors and both dietary restriction and exercise, and these findings are explained in more detail below. However, no significant relationship was found between health behaviors and weight gain. Results of these regressions are found in Table 3.

Dietary restriction—The omnibus test of coefficients (which may be interpreted as a test of how well all predictors in the model jointly predict the dependent variable) for the model predicting dietary restriction (eating fewer than two meals per day) was significant ($\chi^2 = 27.86$, $df = 9$, $p < 0.01$) suggesting that overall, the model was a good fit for the data. The Nagelkerke's R^2 value (which serves as an approximation of OLS R^2 values) for the model was 0.18. For comparative purposes, an OLS R^2 value of 0.18 would indicate that an OLS model accounts for 18% of the variance in the dependent variable.

After controlling for age and education, a significant main effect for non-organizational religiosity (Wald = 6.199, $p = 0.01$) and a significant interaction for non-organizational religiosity and ethnicity (Wald = 3.81, $p = 0.05$) were observed. Post hoc probing of the significant interaction revealed a significant slope for the relationship between non-organizational religiosity and dietary restriction amongst Latina caregivers, but not Caucasians. Thus, higher nonorganizational religiosity was significantly associated with reduced dietary restriction in Latinas but not amongst Caucasians.

Exercise regimen—The omnibus test of coefficients for the model predicting routine maintenance of an exercise regimen (exercising 30 min per day, three times per week) was not found to be significant ($\chi^2 = 13.96$, $df = 9$, $p = 0.12$) suggesting that collectively, the independent variables did not predict well a caregiver's likelihood to maintain an exercise regimen. Other predictors may hold better explanatory value and should be considered in future studies. The Nagelkerke's R^2 value for the model was 0.08. After controlling for age and education, there was a significant main effect for subjective religiosity (Wald = 4.30, $p = 0.04$). There were no significant interactions.

Discussion

The aim of the present study was to explore the relationship between religiosity and caregiver health behavior patterns in an ethnically diverse sample of female dementia caregivers. Primary and exploratory analyses examined the relationship between three dimensions of religiosity: (a) subjective, (b) nonorganizational, and (c) organizational, and

both an index of cumulative health risk and the individual health behaviors subsumed in the overarching index. Moderator analyses were conducted to evaluate the interactive effect of ethnicity and the religiosity dimensions on health behavior patterns. The findings indicate that the pathway between religiosity and health is a multifaceted one, influenced not only by the dimension of religiosity, but also by ethnicity and the interaction between dimensions of religiosity and ethnicity.

In the current study, subjective religiosity and nonorganizational religiosity exerted differential effects on health behavior patterns, and were moderated by ethnicity in opposite directions. Amongst Caucasians, higher subjective religiosity was significantly associated with increased cumulative health risk. Conversely, in Latinas, higher non-organizational religiosity was related to improved dietary practices (reduced dietary restriction). Increased levels of subjective religiosity were significantly associated with decreased maintenance of a routine exercise regimen across ethnic groups.

The finding of a positive relationship between subjective religiosity and increased cumulative health risk among the Caucasian caregivers, though somewhat counterintuitive, is not entirely inconsistent with previous research. Daaleman, Parera, and Studenski (2004) found a non-significant trend in which geriatric outpatients high in subjective religiosity were less likely to report good health status. Similarly, other researchers have observed an inverse relationship between overall health and both non-organized religiosity (Levin et al., 1995) and the use of religious coping (Krause, 2005).

What was unique in the current study, however, was that the relationship between subjective religiosity and health behaviors was moderated by ethnicity. This differential effect of ethnicity on caregiver health behaviors may be partly accounted for by divergent cultural views of religion. Amongst Latinas, views of religiosity, spirituality, and religious coping hold a prominent role in the conceptualization of disease and management of family caregiving responsibilities (Calderon & Tennstedt, 1998), particularly when compared to Caucasians (Mausbach et al., 2003). Thus, the higher subjective religiosity scores of Latinas in the current sample may be an artifact of culturally predicated, positive views of religion. In contrast, Caucasians with high subjective religiosity may be expressing personal religious views more reflective of internal processes than culturally endorsed beliefs.

This interpretation could suggest that amongst caregivers with high subjective religiosity, there may also be ethnic differences in perceived loci of control for health and health outcomes. Caucasians high in subjective religiosity may be more likely than Caucasians low in subjective religiosity to believe that their health is determined by God and not necessarily influenced by factors under individual control. Latinas, conversely, may be more inclined to report higher subjective religiosity irrespective of perceived locus of control (LOC). This proposal that LOC may be responsible for the ethnic differences in religious coping that arose in our study is consistent with previous research documenting an important relationship between LOC and religious coping (Cole & Pargament, 1999; Wong-McDonald & Gorsuch, 2004). While LOC was not a measured variable in the present study, our findings suggest more study is warranted regarding the interrelationship between religious coping, ethnicity, and LOC.

As in the case with cumulative health risk, a negative relationship between subjective religiosity and the maintenance of a routine exercise regimen was observed across both ethnicities, even when controlling for age and education. Although religiosity is associated with exercise in older adults, subjective or intrinsic religiosity has not generally been found to be significant in the extant literature (Roff et al., 2005), making the current findings unique. For caregivers who rely heavily upon religious coping to handle stressful situations,

religiosity and exercise may serve as competing coping mechanisms. That is, if caregivers derive stress-reducing benefits from religion, they may feel a diminished need for utilizing exercise for similar purposes if they do not exercise solely for the health benefits or because of intrinsic reward. A potential avenue for future research would be to explore the interaction of coping and religiosity and its impact on exercise and other preventive health behaviors. The implication for clinicians and religious leaders is that education regarding the importance of exercise as not only a way of coping with exogenous stressors, but also as a way of improving overall health, longevity, and well being, should be a central component of clinical interventions and faith-based wellness initiatives.

Although religiosity as a whole has been linked to improved health, research seems to suggest that public religious involvement (i.e., religious attendance) is more strongly related to health outcomes than private religiousness (McCullough et al., 2000). That the current findings are divergent from previous studies may be due to the current study's predominant focus on health behaviors, which may be less influenced than general health outcomes by the psychosocial benefits inherent in regular organized religious involvement. Additionally, a primary focus of the extant literature on organizational religiosity and health behaviors has been the link between religious attendance and decreased smoking and alcohol consumption (Levin, 1994; Levin & Vanderpool, 1987; Strawbridge, Cohen, Shema, & Kaplan, 1997). Unfortunately, the distribution of responses in the variables assessing drinking and smoking precluded their inclusion in the binary logistic regression analyses (although preliminary point biserial correlations revealed a significant correlation between non organizational religiosity and both drinking ($r = -0.16$, $p < 0.01$) and smoking ($r = 0.17$, $p < 0.01$).

The significant findings for non-organizational religiosity (main effect and significant interaction with ethnicity) on dietary restriction may be partly explained by the manner in which caregivers cope with the caregiving process. In the face of the persistent and unremitting stress associated with caregiving, nonorganizational religiosity, or the use of personal expressions of religion, may be an important way for caregivers to obtain brief periods of respite. Given previous findings that caregivers with high self-efficacy for obtaining respite also experience diminished cumulative health risk (Rabinowitz, Mausbach, & Gallagher-Thompson, 2007), respite obtained by virtue of non-organizational religiosity may also have a positive impact on health and health behavior patterns. Post hoc analyses revealed that the significant finding for non-organizational religiosity was circumscribed to the subsample of Latina caregivers. Latina caregivers, who exhibit higher levels of religious coping than Caucasians (Mausbach et al., 2003), may be more likely to rely upon non-organizational religiosity to obtain respite and cope with caregiving challenges than their Caucasian counterparts.

Another possible contributor to the relationship between non-organizational religiosity and dietary restriction among Latina caregivers may be the extent to which the caregivers practice the spiritual discipline of fasting. Because fasting can be either an organizationally mediated (e.g. during religious holidays) or a highly personal practice, it would be difficult to predict what effect this may have had in our findings since our data do not include items related to the practice of fasting. However, this dimension could be fruitfully explored by future investigations of religiosity and health behaviors as it may be an important domain of spiritual practice for caregivers.

The current findings lend support to the notion that discrete dimensions of religiosity differentially and interactively (with ethnicity) influence health behaviors. The implication for clinicians, researchers, and religious leaders is that a caregiver's ethnicity, overall religiosity, and most utilized dimension of religiosity should be explored as discrete variables. Researchers would benefit from applying more complex models which include

religious resources, psychosocial variables, and demographic characteristics to understand the role of health behaviors in the pathway between caregiver stress and health outcomes. Clinicians should consider religiosity (where appropriate), ethnicity, and the interaction between them when cultivating treatment plans. This may not only help clinicians to target interventions with greater specificity, but may facilitate the identification of personal resources for clients to draw upon in therapy (Pargament, Koenig, & Perez, 2000).

In light of the current findings, religious leaders should be aware that caregivers high in subjective religiosity, particularly Caucasians, may be vulnerable to health risk associated with health behavior patterns. Therefore, their congregations might benefit from education focusing on the importance of health and wellness, and this message may be especially beneficial for caregivers. For the subset of individuals high in both subjective religiosity and organizational religiosity ($r = 0.39$, $p < 0.01$), using sermons and educational programs to relate health and wellness to fundamental aspects of spirituality and religious life may be extremely effective.

Nevertheless, for those who are high in subjective religiosity but not in organizational religiosity, more substantial efforts may need to be undertaken. Religiously affiliated community programs, such as faith-based wellness programs which have been shown to result in improved physical health (DeHaven, Hunter, Wilder, Walton, & Berry, 2004), may be ideally suited for targeting such individuals. This may be particularly appropriate for caregivers who rely upon community centers and programs but who, due to the demands of caregiving, may not be able to attend services regularly. Alternatively, utilizing major holidays, which are more likely than weekly services to draw a broader group of individuals (many of whom having faith but not necessarily high in organizational religiosity), may be another important venue through which to underscore the interrelatedness of health and spiritual wellness.

Limitations of the present study include the gender, ethnic, and geographic characteristics of the sample. As this study limited its sample to female caregivers of dementia patients, gender difference could not be assessed. Furthermore, participants were recruited from only one region of the US making it difficult to generalize these results to caregivers who reside in areas outside of Northern California. This is especially relevant for Latino caregivers who may live in areas where access to information and resources in Spanish is even more limited.

The model tested in the primary analysis accounted for only 12% of the variance in cumulative health risk, suggesting that broader, more comprehensive models need to be explored. Future studies should examine the degree to which caregiver characteristics like kinship and religious preference influence the utilization of health behaviors. Furthermore, Type II error may have been a potential confound in the exploratory analyses, as some researchers have stipulated that logistic regression requires at least 50 cases per independent variable in order to detect statistical significance (Grimm & Yarnold, 1995). Finally, a cross-sectional design was utilized and as such, causality could not be inferred and longitudinal changes in religiosity and health behaviors could not be assessed.

Despite these limitations, the current study represents an important contribution to the literature. The findings call attention to the importance of evaluating multiple constructs of religiosity, as well as caregiver characteristics like ethnicity, to gain an apposite view of the relationship between religiosity and caregiver health. Although religiosity is often a resource, it may, at times, be linked to increased health risk. Thus, clinicians, researchers, and religious leaders could find that they better serve those in their communities by collaborating to ensure that appropriate education and interventions are both developed and employed. Religious leaders may have the potential to play an important role in the health

and well-being of caregivers and should strive to enumerate the important overlap between physical and spiritual health. They can also be an important resource for certain caregivers, and should be viewed as important collaborators in the treatment process by clinicians and treatment teams.

Acknowledgments

Primary support for this research was provided by awards AG13289 by the National Institute on Aging (NIA). Additional support was provided by award AG23989 from the NIA.

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Table 1

Descriptive statistics of study and demographic variables.

Variable	Whole Sample (n = 264)	Caucasians (n=154)	Latinas (n=110)	t, χ^2	p (2-tailed)
High Blood Pressure, n (%)	80 (30.30)	51 (33.12)	29 (26.36)	1.37	0.24
Heart Condition, n (%)	37 (14.02)	27 (17.5)	10 (9.10)	7.71	0.02
Diabetes, n (%)	22 (8.33)	6 (3.89)	16 (14.55)	9.53	<0.01
Chronic Lung Disease, n (%)	18 (6.82)	12 (7.79)	6 (5.45)	0.55	0.46
Cancer, n (%)	6 (2.27)	6 (3.90)	0 (0)	4.36	0.04
Stroke, n (%)	12 (4.55)	6 (3.90)	6 (5.50)	0.36	0.55
Eat Less than 2 meals per day, n (%)	40 (15.2)	17 (11.04)	23 (20.91)	4.86	0.023
Gained > 10 lbs. in 6 months, n (%)	102 (38.60)	51 (33.12)	51 (46.36)	6.42	0.04
Drink more than 2 drinks per day, n (%)	3 (1.10)	3 (1.95)	0 (0)	XXX*	XXX*
Exercise 15–30 min, 2x per week, n (%)	85 (32.20)	56 (36.36)	29 (26.44)	2.94	0.086
Current Smoker, n (%)	19 (7.20)	16 (10.39)	3 (2.73)	XXX*	XXX*

Note: XXX* = too few cases per cell for χ^2 analysis to be conducted

Table 2

Multiple regression analysis with ethnicity regressed on cumulative health risk.

IV	B	SE	β	T
CG age	-0.01	0.00	-0.22	-3.36**
CG education	-0.02	0.01	-0.15	-2.06*
CG ethnicity	-0.05	0.09	-0.04	-0.53
CG subjective religiosity	0.36	0.21	0.14	1.70
CG non-organizational religiosity	-0.21	0.22	-0.10	-0.96
CG organizational religiosity	-0.04	0.02	-0.11	-1.59
CG subjective religiosity $\times$ ethnicity	0.82	0.42	0.15	1.93*
CG non-organizational religiosity $\times$ ethnicity	0.02	0.43	0.00	0.05
CG organizational religiosity $\times$ ethnicity	0.01	0.05	0.02	0.25

Note: B = unstandardized regression coefficient; CG = Caregiver.

* $p < 0.05$;

** $p < 0.01$

Table 3

Binary logistic regression analysis with religiosity and ethnicity regressed on health behaviors.

DV	IV	B	SE	Wald	Odds ratio
Dietary restriction	CG age	-0.13	0.06	4.54**	0.88
	CG education	-0.05	0.02	9.20**	0.95
	CG ethnicity	0.00	0.51	0.00	1.00
	CG subjective religiosity	1.88	1.32	2.04	6.54
	CG non-organizational religiosity	-3.10	1.25	6.20**	0.05
	CG organizational religiosity	0.06	0.14	0.17	1.06
	CG subjective × ethnicity	-1.15	2.61	0.19	0.32
	CG non-organizational × ethnicity	4.89	2.50	3.81*	13.40
	CG organizational × ethnicity	0.01	0.27	0.00	1.01
	CG age	-0.04	0.01	10.84**	0.96
Weight gain	CG education	-0.09	0.05	3.99*	0.91
	CG ethnicity	-0.17	0.38	0.20	0.84
	CG subjective religiosity	0.09	0.91	0.01	1.10
	CG non-organizational religiosity	0.13	0.90	0.02	1.14
	CG organizational religiosity	-0.19	0.10	3.43	0.83
	CG subjective × ethnicity	3.39	1.81	3.51	29.58
	CG non-organizational × ethnicity	-2.02	1.80	1.26	0.13
	CG organizational × ethnicity	0.07	0.20	0.11	1.07
	CG age	0.00	0.01	0.05	1.00
	CG education	0.01	0.05	0.08	1.02
Exercise	CG ethnicity	0.36	0.41	0.77	1.43
	CG subjective religiosity	-1.91	0.92	4.30*	0.15
	CG non-organizational religiosity	0.31	0.91	0.12	1.36
	CG organizational religiosity	0.05	0.11	0.22	1.05
	CG subjective × ethnicity	-1.04	1.83	0.32	0.35
	CG non-organizational × ethnicity	0.75	1.82	0.17	2.12
	CG organizational × ethnicity	-0.28	0.22	1.71	0.75

Note. B = unstandardized regression coefficient; CG = caregiver.

* $p < 0.05$;

** $p < 0.01$.