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Predicting the Trajectories of Depressive Symptoms Among Southern Community-Dwelling Older Adults: The Role of Religiosity

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Abstract

Background—This study examined the effects of religiosity on the trajectories of depressive symptoms in a sample of community-dwelling older adults over a four-year period in a Southern state in the U.S.

Method—Data from the University of Alabama at Birmingham Study (UAB) of Aging were analyzed using a hierarchical linear modeling (HLM) method. This study involved 1,000 participants aged 65 and older ($M_{age} = 75$ at baseline, $SD = 5.97$) and data were collected annually from 1999 through 2003. The Geriatric Depression Scale measured depressive symptoms; the Duke University Religion Index measured religious service attendance, prayer, and intrinsic religiosity; and control variables included sociodemographics, health, and social and economic factors.

Results—The HLM analysis indicated a curvilinear trajectory of depressive symptoms over time. At baseline, participants who attended religious services more frequently tended to report fewer depressive symptoms. Participants with the highest levels of intrinsic religiosity at baseline experienced a steady decline in the number of depressive symptoms over the four-year period,

while those with lower levels of intrinsic religiosity experienced a short-term decline followed by an increase in the number of depressive symptoms.

Implications—In addition to facilitating access to health, social support and financial resources for older adults, service professionals might consider culturally-appropriate, patient-centered interventions that boost the salutary effects of intrinsic religiosity on depressive symptoms.

Keywords

depressive symptoms; HLM; religiosity; trajectories

Depression is a common mental health problem among older adults (Pot, Deeg, Twisk, Beekman, & Zarit, 2005). A report from the National Institute of Mental Health (2003) estimated that the prevalence of major depression among community-dwelling older adults aged 65 or older ranges from 1% to 5%. The percentage of older adults who experience depressive symptoms is much higher, with an expected range from 7.2% to 36% (Alexopoulos, Katz, Reynolds, & Ross, 2001; Djernes, 2006).

Negative consequences of chronic depressive symptoms include increased risks for the onset of major depression (Horwath, Johnson, Klerman, & Weissman, 1992), physical disabilities (Penninx, Deeg, van Eijk, Beekman, & Guralnik, 2000), early mortality (Blazer, Hybels & Pieper, 2001), as well as escalated health care costs (Unutzer et al., 1997). The non-linear growth of depressive symptoms as found in some studies (e.g., Mojtabai & Olfson, 2004; Penninx et al., 2000) indicates a need to examine factors that might influence how depressive symptoms fluctuate over time among older adults. Knowledge of factors that protect older adults from increases in depressive symptoms may lead to prevention or early treatment of depression. Thus, the aim of this study was to examine whether religiosity predicts the trajectory of depressive symptoms among a sample of community-dwelling older adults living in a Southern state in the U.S.

Religiosity may help counteract depressive moods through psychosocial mechanisms including enhanced social support, increased activity engagement, and improved coping (Koenig, McCullough, & Larson, 2001; Johnson, Tompkins, & Webb, 2002). Smith, McCullough, and Poll's (2003) meta-analysis found a small yet consistent association between religiosity and fewer depressive symptoms on the basis of 147 independent studies. Furthermore, Wink, Dillon, and Larsen (2005) identified an indirect salutary effect of religiosity buffering against depression associated with poor health in a sample born in the 1920s in the San Francisco Bay area. One limitation of Wink et al.'s study is a failure to use an objective measure of physical health and to control for functional status, which may confound their conclusions. Overall, evidence suggests that religious involvement in general decreases the risks for and leads to faster remission of depressive symptoms (Koenig, 2007; Koenig, George, & Peterson, 1998). However, a few studies suggest some aspects of religiosity (such as negative religious coping or extrinsic religiosity) may have detrimental effects on mental health (McCullough & Larson, 1999; Schnitker, 2001).

When referring to the relationships between depressive symptoms and specific domains of religiosity, evidence is rather complicated. For the purpose of this study, we define religiosity as shared sets of beliefs and practices that have been developed in community with people who have similar understandings of God or the Transcendent (Geppert, Bogenschutz & Miller, 2007; Koenig, McCullough & Larson, 2001). We operationalize religiosity as a multidimensional concept that encompasses organizational religiosity (OR), non-organizational religiosity (NOR), and intrinsic religiosity (IR). In the following section, we review evidence regarding the relationships between different domains of religiosity and depressive symptoms.

Religiosity and Depression

The first dimension, OR, refers to the engagement of individuals in organizational religious activities, such as church attendance. Church attendance is often related to physical health and functional status (Koenig, et al., 1997a), which in itself predicts depression. When controlling for physical functioning status, Koenig et al. (1997a) found that frequent church-goers are less likely to be depressed than non-church-goers among a sample of community-dwelling American older adults in North Carolina. Similarly, Braam and associates (2004) identified an inverse relationship between church attendance and depressive symptoms among a sample of older adults in Netherlands. Thus, the benefits of involvement in OR include opportunities for individuals to meet with other church members and participate in church activities that could be religious or social in nature. Furthermore, attendance may promote a sense of purpose in life that is critical to the self-esteem and well-being of individuals (Law & Sbarra, 2009).

The overall cross-sectional evidence suggests an inverse relationship between religious service attendance and depressive symptoms, but there is a need for longitudinal evidence to support this finding. In one of the few available longitudinal studies, Law and Sbarra (2009) followed a sample of Australian older adults over an eight-year period and found that non-church-goers had higher levels of depression at baseline and an increased rate of developing depressed mood over time than church-goers. Yet, Law and Sbarra's findings may be limited because only two time points separated by an eight year interval were assessed, and only church attendance was examined. Thus the possible relationships between other dimensions of religiosity and the trajectories of depression were not explored. However, based on the minimal evidence to date, we tentatively hypothesized that religious service attendance would be related to fewer depressive symptoms at baseline (Hypothesis 1_a), and would have a buffering effect on the increases in depressive symptoms over time (Hypothesis 1_b).

The second dimension, NOR, refers to private religious behaviors such as prayer, meditation, or Bible study. Inconsistent evidence has been found regarding the influence of this religious domain on depression. On the one hand, McCullough and Larson's (1999) review found a minimal and inconsistent association between private religious activities and depression. On the other hand, King and colleagues' (2007) longitudinal study of older patients found an inverse relationship between NOR and depression at baseline and a non-linear relationship over time. Participants who reported high or low engagement in NOR at baseline were more likely to be depressed one year later than those who reported moderate amounts of NOR engagement. Because of the mixed and limited previous research, we did not make explicit hypotheses regarding the associations between NOR and changes in depressive symptoms.

The third dimension, IR, reflects the perceived importance of religion to the individual. IR captures the ultimate significance of religion in individuals' decision making. Koenig, George, and Peterson (1998) found that intrinsic religiosity predicted shorter time to remission of depression in a sample of 87 medically ill older patients, while the effects of OR and NOR were not significant. Older persons with high intrinsic religiosity may derive self-esteem and sense of well-being from their religious faith, which comprises an important component of their identity. They may have a sense of larger social networks and become better equipped to cope with adversities (e.g., physical illness). One of the few longitudinal studies on the effects of IR (Braam et al., 2004) confirmed that individuals who had a strong religious faith were less likely to be depressed over a one-year period. Based on previous findings (e.g., McCullough & Larson, 1999), we hypothesized that higher levels of intrinsic

religiosity would be related to fewer depressive symptoms at baseline (Hypothesis 2_a) and have a buffering effect on the changes in depressive symptoms over time (Hypothesis 2_b).

Purpose of Study

A review of the literature indicated the need to examine the trajectories of depressive symptoms among community-dwelling older adults in the U.S. First, neither cross-sectional nor longitudinal studies that have assessed depressive symptoms (e.g., Penninx et al., 2000) have elucidated the trajectories of depressive symptoms in older adults. Second, most studies in the U.S. have been based on samples of medically ill older patients (e.g., King et al., 2007; Koenig, 2007) who may have more physical or mental illness than their community counterparts. Grounded in the thinking of preventive care, this study recruited participants from community settings, where the majority of older participants are not clinically depressed. Understanding the changes in depressive symptoms and associated risk factors in the community sample would help health care personnel manage depressive symptoms and prevent major depression. Third, the multiple domains of religiosity have not been examined systematically in relation to changes in depressive symptoms. To prevent depression or provide early treatment, it is important to know about the changes in depressive symptoms among community samples.

Responding to these gaps, we examined the trajectories of depressive symptoms over time and the influence of three dimensions of religiosity on those trajectories, while controlling for the effects of other known risk factors of depressive symptoms. These known risk factors included gender (Cole & Dendukuri, 2003), non-married status (Law & Sbarra, 2009), poor physical health (Roff et al., 2004), cognitive deficits (Mojtabai & Olfson, 2004), functional limitations (Oxman, Berkman, Kasl, Freeman, & Barrett, 1992), and lower social support (Roff et al., 2004).

Methods

This study was based on a secondary data analysis of the University of Alabama at Birmingham (UAB) Study of Aging. The UAB Study of Aging is a population-based, prospective study of community-dwelling adults. The sample consisted of 1,000 adults aged 65 years and older from a list of Medicare beneficiaries in five Alabama counties. The sample was stratified by county, race, and sex, and included balanced numbers of Black men and women and White men and women (for details about the research design, see Allman, Sawyer, Maisiak, Sims, & Roseman, 2004; Allman, Sawyer, & Roseman, 2006). All baseline interviews and the four-year follow-up interviews were conducted in the participants' homes; follow-up interviews at years 1, 2 and 3 were conducted by telephone. The current study examined baseline data and four waves of follow-up data collected annually from 1999 to 2003.

We found that the four-year attrition rate was similar to previous longitudinal studies (Hong, Hasche, & Bowland, 2009; Penninx et al., 2000). Depressive symptom scores of one participant were missing at baseline; 8.5% were missing at Wave 1; 16.1% missing at Wave 2; 26.4% missing at Wave 3; and 37.6% missing at Wave 4. By the four-year follow-up period, 217 participants died and 49 were unable to give answers to the survey questions on their own, leaving 734 eligible participants; of these 624 (85.0%) agreed to follow-up in-home assessments at year 4. We compared participants for whom we had depressive symptom scores at baseline and all four follow-ups with those who did not (see Table 1). Compared to participants who completed all five interviews, those who did not were more likely to be older, male, and non-married; to have lower education, lower MMSE scores, more ADL and IADL difficulties, and poorer health; to report more sick days and less

income adequacy; and to engage less in religious service attendance and prayer. Similar to findings in a previous study (Haynie, Berg, Johansson, Gatz, & Zarit, 2001), those who reported more depressive symptoms at baseline were less likely to complete all interviews. In light of this, the assumption of data missing completely at random is implausible. Estimation of the trajectories could be biased if only participants who completed assessments at all time points were included (Raudenbush & Bryk, 2002). Thus, we decided to use all available data to estimate the trajectories of depressive symptoms.

Participants

Participants were 75 ($SD = 5.97$) years old on average at baseline. Stratification by gender and ethnicity results in the sample being 50% African Americans / 50% Caucasians, and 50% women at baseline. About half (51.3%) of participants were married at baseline. Given the coding of education in study (sixth grade or below as 6), an average educational level of 10.06 ($SD = 3.26$) indicated an average educational level below 10th grade. The median educational level of participants indicates 50% of the participants completed twelfth grade.

Measures

Depressive symptoms—The short form of the Geriatric Depression Scale (GDS; Sheikh & Yesavage, 1986) was used to assess depressive symptoms. The GDS counts the number of symptoms of depression reported by the participant. Scores can range from 0 to 15; a score of six or higher suggests possible depression and the need for a more comprehensive assessment and accurate diagnosis (Aikman & Oehlert, 2001). About 6.9% of participants reported 6 or more symptoms at baseline in this study. This proportion is comparable to what is found in Rokee and Klenow's (1998) and Diem et al.'s (2007) studies; both studies reported that about 5% in their community samples of older adults had a GDS score worthy of clinical attention. The Cronbach's alphas over the five time points were .73, .70, .67, .65, and .70.

Religiosity—To measure religiosity, we used a slightly modified version of the Duke University Religion Index (Koenig, Meador, & Parkerson, 1997b). This is a 5-item measure of three major dimensions of religiosity: organizational religiosity (OR), non-organizational religiosity (NOR), and intrinsic religiosity (IR). OR was measured by a single item, scored from 1 = *never* to 6 = *more than once a week* on attendance at religious services or other religious meetings. NOR was measured by the frequency of private religious activities such as prayer, meditation, or bible study on a scale from 1 = *never* to 6 = *more than once a week*. IR was measured by the summed scores of three items. Participants indicated how true each of the following statements was for them using a 5-point scale: "In my life, I experience the presence of the Divine" (i.e., God); "My religious beliefs are really what lie behind my whole approach to life"; and "I try hard to carry my religion over into all other dealings in life." Scores on the intrinsic religiosity variable could range from 3 (low intrinsic religiosity) to 15 (high intrinsic religiosity). Cronbach's alpha for the intrinsic religiosity subscale was .83.

Health variables—The measures of physical health included self-rated health, number of sick days in bed, physical limitations and cognitive status. Self-rated health was measured by a single item ranging from 0 = *poor* to 4 = *excellent*. Another indicator of physical health was the number of sick days in bed in the past 12 months. Functional capacity was measured by difficulties with activities of daily living (ADL) such as dressing and eating; and the instrumental activities of daily living (IADL) such as cooking and doing laundry (Kovar & Lawton, 1994). The range of the ADL difficulties was from 0 to 7 and the number of IADL difficulties ranged from 0 to 6. Cognitive status was assessed using the Mini Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975).

Resource variables—Perceived social support was measured using the social support subscale of the Arthritis Impact Measure (AIM) (Ren, Kazis, & Meenan, 1999). It included four questions that asked participants to indicate the perceived availability of, sensitivity to, interest in, and understanding of friends and family in providing assistance on a five-point Likert scale. The total score ranges from 5 to 20, with a higher score indicating more perceived social support. The Cronbach alpha was .79 at baseline on this sample. Income adequacy was measured by a Likert scale ranging from 1 = *not enough to make ends meet* to 4 = *allows you to do more or less what you want*.

Sociodemographics—In addition to health and resource variables, control variables included sociodemographic characteristics: age, gender (1 = *female*; 0 = *male*), ethnicity (1 = *Black*; 0 = *White*), marital status (1 = *currently married*; 0 = *otherwise*) and education (the highest grade completed, coded as “6th grade or less” as 6 all the way up to “graduate degree” as 17).

Analysis Strategies

The HLM procedure was used to estimate the trajectory of GDS scores over a four-year period. HLM has the capacity to analyze information about the rate and the pattern of change in targeted variables over multiple time points, taking into account inter- and intraindividual variability in change and cross-level interactions of time with predictors (Raudenbush & Bryk, 2002). We ran analyses using the HLM software (version 6.02; Raudenbush, Bryk, & Congdon, 2005).

We used a two-level hierarchical linear model to predict individual change in depressive symptoms (Raudenbush & Bryk, 2002; Raudenbush et al., 2005). The level 1 model specified the shape of individual change parameters (i.e., intercept, linear growth rate, and acceleration) over time. The level 2 model tested the effects of measures of baseline religiosity on individual change parameters when controlling for the effects of sociodemographic characteristics, health, and resources available to an individual at baseline. These models assumed that individuals have different growth parameters.

The two models are represented by the following equations:

$$\text{Level 1 model: } Y_{ij} = \beta_{0j} + \beta_{1j}(\text{Time})_{ij} + \beta_{2j}(\text{Time})^2_{ij} + \varepsilon_{ij}. \quad (1)$$

Level 2 model:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Religiosity}) + \gamma_{02}(\text{Sociodemographic characteristics}) + \gamma_{03}(\text{Health}) + \gamma_{04}(\text{Resources}) + u_{0j} \quad (2)$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{Religiosity}) + \gamma_{12}(\text{Sociodemographic characteristics}) + \gamma_{13}(\text{Health}) + \gamma_{14}(\text{Resources}) + u_{1j} \quad (3)$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21}(\text{Religiosity}) + \gamma_{22}(\text{Sociodemographic characteristics}) + \gamma_{23}(\text{Health}) + \gamma_{24}(\text{Resources}) + u_{2j} \quad (4)$$

Y_{ij} is the depression scale score of subject j at time i ; β_{0j} is the intercept of depression score at baseline for subject j ; β_{1j} is the linear rate of change at baseline; and β_{2j} represents the acceleration of the linear rate of change. The level 2 model predicted the individual change parameters (β_{0j} , β_{1j} , β_{2j}). The γ terms represent intercepts and the expected effects of the covariates on the individual change parameters. To determine the appropriate level 1 model (i.e., intercept, linear effect, quadratic effect), we examined the graphs of depressive symptoms over time to ascertain whether a quadratic function might be appropriate. To

verify the decision on the basis of the visual information, we also examined the statistical significance of the individual change parameters in the fixed- and random-effects unconstrained models. The continuous predictors (i.e., religiosity-related variables, age, perceived income adequacy, and social support) were modeled in the grand mean deviation form to reduce multicollinearity concerns (Raudenbush & Bryk, 2002).

Results

Table 2 presents the means and standard deviations of GDS scores over a four-year period. The mean of GDS scores was 2.36 ($SD = 2.33$) ($n = 999$) at baseline, decreased to 1.28 ($SD = 1.57$) ($n = 839$) at two years from baseline, and then increased to 2.11 ($SD = 2.10$) ($n = 624$) at four years from baseline.

To determine the appropriate model for the trajectories of depressive symptoms, we ran two unconstrained models that examined the linear and quadric effects of time (see in Table 3). Table 3 shows the fixed effects, random effects, and deviance scores for GDS scores. The quadratic model was a better fit than the linear model on the basis of the comparison of their deviance scores [$\chi^2(3) = 546, p < .001$]. There were significant fixed effects for the intercept ($B = 2.36$), linear effect ($B = -1.04$), and curvilinear effect ($B = .26$) in the quadric model, indicating that participants appeared to have a decrease in the number of depressive symptoms over the first two years, and an increase in the last two years (see Figure 1). Random effects indicate if there is evidence of significant individual variations in growth trajectories (around mean intercept and slope); if these trajectory parameters are significant, inclusion of predictors of the trajectory parameters (level-2 predictors) could be justified to explain individual variations (Raudenbush & Bryk, 2002). The results of the random effects show there were significant variations in the intercept (1.64) and slope (0.18).

Table 4 shows the HLM results of the effects of level-2 factors on the trajectories of GDS scores. Among the three religiosity measures, only religious service attendance was associated with fewer depressive symptoms at baseline ($B = -.15, p < .01$). In addition, two sociodemographic factors and all health and resource variables were related to depressive symptoms in expected directions. Being white and having higher education were associated with more depressive symptoms. More ADL and IADL limitations and more sick days were also associated with more depressive symptoms, while better self-rated health, better cognitive status, more social support and higher level of income adequacy were related to fewer depressive symptoms.

In examining quadratic effects among the three religiosity domains, only IR ($B = -.021, p < .01$) was predictive of a quadratic effect. The relationship between IR and the number of depressive symptoms over time was better illustrated in a graph that plots the changes in GDS scores by three different IR levels (see Figure 2). Participants with the highest levels of intrinsic religiosity at baseline experienced a steady decline in the number of depressive symptoms over the four-year period while those with lower levels of intrinsic religiosity experienced a short-term decline followed by an increase in the number of depressive symptoms.

The quadratic effects of two sociodemographic factors, one health indicator, and two resource variables were significant. Whites and those with higher educational levels tended to experience a substantial decrease initially, followed by a more rapid increase in depressive symptoms than Blacks and those with lower educational levels. Similarly, participants with better health, more social support, and higher levels of income adequacy had a minimal decrease initially, followed by a slower increase in depressive symptoms than

those with poorer health, less social support, and lower income adequacy (figures not shown).

Discussion

The first aim of our study was to describe the trajectories of depressive symptoms over time. We tested both linear and quadratic effects between time and changes in depressive symptoms. A rough description of changes in depressive symptoms can be achieved by simply comparing values at starting and ending points, a method often used in existing longitudinal studies (e.g., Law & Sbarra, 2009). Our findings were comparable to other previously published longitudinal studies. When we compared the GDS scores of those who completed all five waves, the average GDS scores increased from 1.98 ($SD = 2.08$) to 2.11 ($SD = 2.10$) on a scale from 0 to 15 over the four-year period. That is fairly consistent with the findings concerning Austrian older adults, who increased 2.51 on a CESD scale from 0 to 60 over a five-year period (Law & Sbarra, 2009). It would be premature to conclude that older adults have a steady increase in their depressive symptoms over time, given that those who were more depressed at baseline were more likely to drop out of the study. It is also important to note that these are small fluctuations in people who have normal mood. Moreover, the significance of quadratic effects indicated a potentially complicated pattern of depression trajectories. In our study, we found the trajectories appeared to be non-linear: the depressive symptoms followed a downward trend first and then an upward trend. A similar pattern was identified in a longitudinal study of depressive symptoms in Swedish oldest old adults (Haynie et al., 2001). Haynie et al. suggested the decline in depressive symptoms in the mid-point could be due to the positive feelings associated with participants' anticipations of meeting with the interviewer. Given little evidence in this regard, future studies need to extend findings of this study by examining concomitant life events (i.e., loss or bereavement) at each assessment point.

Our first hypothesis about the effects of religious service attendance was partially supported. The association between religious service attendance and baseline depressive symptoms was substantiated in our analyses. This finding corresponds to Koenig et al.'s (2001) conclusion based on a review of cross-sectional studies of the relationship of organized religious activity with depression. Service attendance may reflect a person's functional status in that those who have mobility difficulties might be limited in their church attendance, which may lead to depressive feelings. Yet, the fact that church attendance was still significantly related to depressive symptoms with ADL and IADL difficulties controlled suggests possibility of other explanations. Frequent service attendees tend to be less isolated or unhappy because they were more socially integrated into a group and into their communities than those who do not (Strawbridge, Sherma, Cohen, & Kaplan, 2001). Frequent service attendees may also have more opportunities to access educational or health information available in some religious communities.

Consistent with Schnittker's (2001) finding, we found religious service attendance did not predict the change rate of depressive symptoms. In other words, the initial difference in depressive symptoms among participants with different levels of religious service attendance remained constant over the years. Thus, facilitating religious service attendance among older adults with few depressive symptoms could maintain a low risk for the onset of depression over time. However, for persons already experiencing substantial depressive symptoms, encouraging religious service attendance could be one among a number of potential interventions (e.g., mental health treatment) that might be beneficial.

Our second hypothesis was partially confirmed. There was no relationship between IR and baseline depressive symptoms, but participants with the highest levels of IR at baseline

experienced a steady decline in the number of depressive symptoms over the four-year period, while those with lower levels of IR experienced a short-term decline followed by an increase in the number of depressive symptoms. This finding indicated that the importance of religiosity to an individual's life might not influence one's current mood, but over time, it influenced the rate of change in depressive symptoms. This finding is similar to a previously mentioned study by Koenig et al. (1998), which found medically ill patients with higher IR tended to have a 70% faster recovery from depression. As McCullough and Larson (1999) pointed out, people who are religious because they believe that being religious is meaningful in and of itself are predisposed to slower increases in depressive symptoms. Another explanation could be that people with higher IR are more capable of handling stressful life situations because they are motivated and empowered by their religious faith. We speculate that in situations of declining physical health, people with higher IR may be able to better manage their disease symptoms because of their hope and confidence (Koenig et al., 1998) derived from strong religion identity or faith-facilitated networks.

The importance of intrinsic religiosity identified in this study reinforces some practical implications for helping professionals. It is recommended that clients' spiritual history be assessed to ensure treatment of the whole person (Koenig, 2004). A panel of the American College of Physicians suggested the use of four questions to assess spiritual history, and two of these questions are related to intrinsic religiosity: Is faith (religion) important to you in this illness?; and Has faith (religion) been important to you at other times in your life? (Lo, Quill, & Tulsky, 1999). There is also emerging evidence supporting the efficacy of spiritually modified cognitive therapy (Hodge, 2006) and faith-based interventions (Hurst, Williams, King, & Viken, 2008) in treating depression. Inspired by such evidence, we recommend health professionals assess intrinsic religiosity, support religious beliefs and coping when such needs are perceived among older clients, and design and implement possible interventions to boost the salutary effect of intrinsic religiosity.

There was no relationship between NOR and depressive symptoms found in this study. Considering that sicker individuals might be more likely to engage in private religious practices and that private religious activities are linked with coping mechanisms for pain associated with chronic illness such as arthritis (Haley, Koenig, & Bruchett, 2001; Powell, Shahabi, & Thoresen, 2003), we suspect that stressful events such as chronic conditions may obscure the relationship between prayer and depressive symptoms. As expected, higher levels of self-rated health, social support, and income adequacy were related to fewer depressive symptoms at baseline and slowed down the acceleration of depressive symptoms over time. This implies that future interventions should continue to work on improving elders' health, enhancing their access to social support, and ensuring financial security.

The findings of this study need to be interpreted with certain limitations in mind. First of all, our analysis was limited to the variables in the data set. For example, we did not have a measure of religious coping, which could counteract depressive symptoms directly or act through IR to affect changes in depressive symptoms. Future studies may include other important covariates of depressive symptoms, such as traumatic events, perceived discrimination, and resilience. Second, we found that those who had more functional limitations, engaged less in church attendance and prayer, and scored higher on GDS were more likely to drop out of this study. Such attrition could affect the range of change in GDS observed in this study. Third, the existence of heterogeneities in individual trajectories of depressive symptoms may limit the generalizability of our findings. For example, Penninx et al. (2000) examined changes in depression among 2,000 Dutch older adults over a three-year period and identified four groups: the chronically depressed, the non-depressed, the emerging depressed, and the remitted depressed. Future studies need to examine the trajectories for each of these subgroups. Lastly, it should be noted that participants in this study were

predominantly Christian. Further research is needed to understand how different dimensions of religiosity affect depressive symptoms among people of other faiths.

Conclusion

The present study represents one of the first attempts to examine the influence of multiple dimensions of religiosity on the trajectories of depressive symptoms among community dwelling older adults. We found that different domains of religiosity exerted different influences on depression measured by the GDS in this sample of older adults. Overall, religious service attendance and intrinsic religiosity were inversely correlated with depressive symptoms. Religious service attendance was associated with a smaller number of depressive symptoms at baseline, while intrinsic religiosity predicted a slower acceleration rate of depressive symptoms over time. Given that the evidence is preliminary, we recommend more longitudinal studies to be conducted to more fully examine the relation of religiosity and depressive symptoms. If these findings are confirmed in future research, then interventions for depressive symptoms including a careful assessment of a person's religiosity should be tested. In addition to the religious measures used in this study, clinical assessment tool should be included. For example, Fitchett et al. (2004) found that some people experience religious struggle following a diagnosis of severe illness and that religious struggle is associated with depressive symptoms. Thus, using the screening tool for religious/spiritual struggle is recommended as the first step in clinical assessment of a person's religiosity (Fitchett & Risk, 2009) before the possible integration of religious elements into psychotherapeutic treatments.

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Figure 1.
Changes in GDS over a four-year period.
Note. GDS= The Geriatric Depression Scale

Figure 2.
Changes in Depressive Symptoms over Time by levels of Intrinsic Religiosity
Note. GDS = The Geriatric Depression Scale; IR= Intrinsic Religiosity.

Table 1

Baseline Characteristics of All Participants and Those Who Dropped out during the Four Years

	Participants at baseline (n =1000)	Participants dropped out during the four years (n=376)
	B (SD)/ Percentage	B (SD)/ Percentage
Sociodemographics		
Age *	74.95 (5.97)	77.03 (6.08)
Black	50%	52.4%
Female *	50%	44.4%
Married *	51.3%	44.4%
Education *	10.60 (3.26)	10.06 (3.22)
Health		
MMSE *	25.00 (4.86)	23.15 (5.68)
ADL *	1.30 (1.85)	1.84 (2.07)
IADL *	1.11 (1.49)	1.56 (1.72)
Self-rated health *	2.79 (1.13)	2.49 (1.10)
Sick days *	5.23 (29.92)	9.45 (43.04)
Resources		
Social support	6.10 (3.07)	6.17 (3.37)
Income adequacy *	2.75 (.97)	2.55 (.94)
Religiosity		
Religious service attendance *	4.31 (1.71)	3.91 (1.79)
Prayer *	5.38 (1.40)	5.23 (1.60)
Intrinsic religiosity	12.11 (2.00)	12.02 (2.07)
Depression *	2.36 (2.33)	2.99 (2.57)

Note.

* Older age, being male, non-married status, lower education, lower MMSE, more ADL and IADL limitations, poorer health, more sick days, less inadequacy, less involvement in religious service attendance and prayer, and higher depression predicted attrition.

Table 2

Means and Standard Deviation of GDS by Time

Wave	GDS	
	Mean/SD	N
Baseline	2.36 (2.33)	999
Wave 1 (12 months)	1.52 (1.82)	915
Wave 2 (24 months)	1.28 (1.57)	839
Wave 3 (36 months)	1.37 (1.59)	736
Wave 4 (48 months)	2.11 (2.10)	624

Table 3

Unconstrained Linear and Quadratic Functions of Time with Depressive Symptoms

Variable	GDS Depressive Symptoms			
	Linear Model		Quadratic Model	
	B	SE	B	SE
Fixed effects				
Intercept	1.95***	.06	2.36***	.07
Linear effect	-.06***	.02	-1.04***	.06
Quadratic effect			.26***	.02
Random effects	SD	χ^2	SD	χ^2
Intercept	1.64	2540.16***	1.99	3161.43***
Linear effect	.18	995.85*	1.15	1306.05***
Quadratic effect			.28	1258.12***
Level 1 error	1.39		1.18	
Deviance(df)	16041.59(4)		15495.29(7)	

Note.

 $p < .001$;*
 $p < .05$

Table 4
Relationship of Measures of Religiosity, Sociodemographic Characteristics, Health, and Resources on GDS Changes Over Time

	Intercept		Linear Effect		Quadratic Effect	
	B	SE	B	SE	B	SE
Intercept	3.695	.284	-1.856	.273	.471	.069
Religiosity						
Attendance	-.150**	.046	.001	.043	.006	.011
Prayer	.021	.059	-.006	.056	.001	.013
Intrinsic	-.013	.039	.068	.035	-.021**	.009
Sociodemographics						
Age	.007	.011	.007	.011	.001	.002
Black	-.489***	.136	.278*	.131	-.066**	.032
Female	.193	.134	.067	.130	-.022	.032
Married	-.075	.141	.039	.137	-.010	.034
Education	.061*	.026	-.049	.026	.014*	.006
Health						
Self-rated health	-.322***	.063	.152*	.063	-.038*	.016
MMSE	-.046**	.017	.010	.019	-.007	.005
ADL	.222***	.054	-.062	.055	.013	.014
IADL	.234***	.068	-.043	.067	.007	.016
Sick days	.008*	.003	.001	.001	.001	.001
Resources						
Social support	-.112***	.023	.066**	.023	-.013*	.006
Income adequacy	-.417***	.083	.229**	.081	-.056**	.020
Random effect						
SD	1.440		1.060		.259	
Chi-square/df	2073.195/828		1215.757/828		1180.035/828	

Note.

100' > d

'10' > d
**
'50' > d
*

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