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Does a cancer diagnosis influence religiosity? Integrating a life course perspective

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ABSTRACT

Based on a life course framework we propose that a cancer diagnosis is associated with increased religiosity and that this relationship is contingent upon three social clocks: cohort (1920–1945, 1946–1964, 1964+), age-at-diagnosis, and years-since-diagnosis. Using prospective data from the National Survey of Midlife Development (N = 3443), taken in 1994–1995 and 2004–2006, we test these arguments. Results showed that a cancer diagnosis was associated with increased religiosity. Moreover, we found: (a) no evidence that the influence of cancer varied by cohort; (b) strong evidence that people diagnosed with cancer at earlier ages experienced the largest increases in religiosity; and (c) no evidence that changes in religiosity are influenced by years-since-diagnosis. Our study emphasizes how personal reactions to cancer partly reflect macro-level processes, represented by age-at-diagnosis, and shows that the religion-health connection can operate such that health influences religiosity. The study also highlights the sociological and psychological interplay that shapes people's religiosity.

1. Introduction

Does a cancer diagnosis influence religiosity? The answer to this question has important theoretical implications because of the ways that it integrates psychological and sociological perspectives. Here we conceive of religiosity as a combination of two factors: religious-based decision making and comfort one gets from religion. Two core themes help to frame our study: (1) cancer is often a highly stressful experience that may have important consequences for many different aspects of people's lives, especially religiosity; and (2) cohort and the timing of a cancer diagnosis may be influential in these processes.

Surprisingly, research on the association between cancer and changes in religiosity is scarce. The centrality of religion for meaning and support suggests that religion may be highly salient when a catastrophic health crisis occurs. The potential importance of religion is further underscored by research showing that religious beliefs and practices are positively associated with preventive health behaviors, adhering to treatment regimens, optimism about early medical treatment for cancer, self-rated health (Benjamins et al., 2006; Lee et al., 2006), as well as psychological well-being and effective coping (Koenig, 2008). The increasing prevalence of cancer, coupled with research suggesting that religion may be a central resource when

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cancer occurs, reveals a critical oversight in the literature regarding the relationship between cancer and religiosity. We seek to address that gap in this study.

2. A cancer diagnosis and its implications for religiosity

Two main factors contribute to the hypothesis that a cancer diagnosis can lead to increased religiosity. First, a cancer diagnosis is a potent stressor that can force people to deal with concerns related to control, mortality, identity, fear, and suffering. Second, because of the unique existential concerns precipitated by a cancer diagnosis (e.g. impending mortality, meaning of life), religious resources may be especially psychologically advantageous.

A cancer diagnosis can be thought of as a chronic stressor which arises as a discrete life event (i.e. cancer diagnosis) but continues to create stress long after the event has passed (e.g. fear of recurrence, loss of functioning). Although not all individuals view their diagnosis as traumatic, a cancer diagnosis has the potential to radically alter an individual's self-concept and shatter the notion that individuals are able to understand the causes of their experience. Many individuals with cancer feel powerless and express uncertainty about their path toward improved functioning (Kaiser, 2008). Also, a cancer diagnosis can evoke fear of suffering, disfigurement, debilitating treatment, and loss of functioning (Heidrich et al., 1994). The coupling of an instinct for self-preservation combined with a knowledge that everyone will die can create anxiety, worry, and even paralyzing levels of fear (Greenberg et al., 1997). These emotional experiences may be especially evident among people with cancer.

According to Lazarus and Launier (1978), coping refers to "efforts, both action-oriented and intrapsychic to manage (that is, master, tolerate, reduce, minimize) environmental and internal demands, and conflicts, which tax or exceed a person's resources" (p. 288). One function of coping involves regulating emotions by diverting attention or changing the meaning of the stressor (emotion-focused coping). Emotion-focused forms of coping are more common when the stressor is viewed as unchangeable and not under an individual's control. Hence, because a cancer diagnosis often elicits these concerns, the need for emotional regulation becomes particularly important. Religion is uniquely situated to equip people with emotionally-based coping mechanisms as it can alleviate existential concerns regarding life and death that often arise after a cancer diagnosis.

Although a long tradition of psychological theory held that the use of religion in the coping process was unhelpful and even destructive, more recent work by Pargament and his associates has cast valuable new light on the potentially salubrious effects of religious and spiritual coping practices (Pargament et al., 1998, 2000). For many religious persons, God is not an abstract or distant entity, but rather a trusted member of their intimate network, a secure attachment figure who is always available for guidance and solace (Kirkpatrick, 2004). These religion-based resources may equip adherents with a sense of control, a stronger sense of self, deeper emotional bonds, and a sense of mattering (Pollner, 1989; Schieman et al., 2010). Also, the doctrines of most major world religions teach that part of the self survives after the death of the physical body. For this reason, religious belief may make individuals less afraid, anxious, worried, and terrified by the prospect of their own mortality (Wink and Scott, 2005).

A modest literature provides empirical support for our argument that a cancer diagnosis might lead to increased religiosity. Studies using convenience samples routinely find that roughly half of people reported becoming more religious after being diagnosed with cancer (Moschella et al., 1997; Feher and Maly, 1999). Using nationally representative longitudinal data, Ferraro and Kelley-Moore (2000) tested if a cancer diagnosis was associated with seeking "religious consolation" which they defined as seeking religious or spiritual meaning, comfort, and/or inspiration when faced with personal difficulties. They found that being diagnosed with cancer was associated with higher religious consolation using cross-sectional but not longitudinal data. That study, however, did not use prospective data to test the relationship.

3. Cancer diagnosis and religiosity in a life course context

Broadly speaking, the life course framework is concerned with the relationship among human lives and a changing society, the timing of lives, linked or independent lives, and human agency (Elder, 1994). Our study focuses on two of these dimensions: a changing society (measured via birth cohort) and the timing of lives associated with a cancer diagnosis (measured via age-at-diagnosis and years-since-diagnosis). We conceptualize these dimensions as "social clocks" in order to understand the complexities in how a life transition—such as that precipitated by a cancer diagnosis—might be associated with changes in levels of religiosity (George, 1993).

3.1. Social context and experiences of birth cohorts

Given the pronounced differences among cohorts in norms related to religious involvement, the effect of cancer on religiosity may be shaped by cohort membership. We base this assertion on two factors associated with younger cohorts; (1) they report lower levels of religiosity, which affords greater opportunity for increases in religiosity after a cancer diagnosis; and (2) the socio-cultural context regarding religion for this cohort is more individualistic and promotes seeking support and comfort—factors that may be beneficial for some people who are diagnosed with cancer.

Each cohort has distinctive characteristics reflecting the circumstances of its unique entry into the social world and subsequent age-graded exposure to social conditions and cultural transformations (Ryder, 1965). In this analysis, we distinguish three birth cohorts: 1920–1945 (Cohort 1), 1946–1964 (Cohort 2), 1964+ (Cohort 3). Younger cohorts may be markedly less religious than their older counterparts as levels of religious attendance and belief in biblical inerrancy have declined across cohorts for nearly every major religious tradition (Sherkat, 2008). Also, while younger cohorts show similar rates in the belief in God, they are more likely to believe with doubt than their older counterparts (Sherkat, 2008). Moreover, the proportion of people reporting no religious affiliation has grown rapidly in recent years (Hout and Fischer, 2002). While these patterns suggest decreasing religiosity among younger cohorts, research shows that other forms of religiosity, such as belief in life-after-death or miracles, have remained relatively constant (Greeley and Hout, 1999).

Among younger cohorts, it may be more common and socially acceptable to be critical of religion, or even to abandon it altogether. In recent decades religion has taken on a decidedly therapeutic, service-oriented cast (e.g. Hunter, 1987). Religion has been increasingly characterized by a consumerist mentality as a result of shifting norms from self-sacrifice and commitment to personal freedom (Roof, 2000; Lesthaeghe, 1995). Indeed, this consumerist, "shopping" orientation to religion came of age with the Boomers, and has continued or accelerated with later cohorts (Roof, 2000). Individuals in later cohorts may feel more justified than their counterparts from earlier cohorts in searching for a new faith or tradition to help acquire coping, emotional, and instrumental resources when needed.

3.2. Age-at-diagnosis and changes in religiosity

The life course perspective suggests that life events such as a cancer diagnosis may have a differing impact depending on the context under which they occur and the resources accessible to people experiencing them (George, 1993). This idea has led to the notion of an "off-time" transition which occurs at non-normative ages and can lead to disruptions in an individual's personal life. An "off-time" transition tends to be more stressful and entails particularly negative psychological outcomes (Pearlin and Skaff, 1996). Because most cancers are diagnosed among people over 50 years old, cancers that affect younger people – especially persons under 40 years old – can be considered "off-time" compared to similar conditions that develop at later stages of the life course.

Younger adults are more likely to face expectations that they fulfill work and family obligations and cancer is more disruptive of daily activities for this group (LaChapelle and Hadjistavropoulos, 2005). The experience of cancer may be especially stressful among younger people because they have more competing demands on their time and resources (Mor et al., 1994). Younger people with cancer may have young children who require more assistance than they are able to offer. Having cancer may disrupt the whole family at a time when their young children need immense instrumental and emotional support. Those that are younger may be more likely to have a spouse with full-time employment that will not be able to provide the kind of instrumental support that older retired spouses might (Mor et al., 1994).

Living with cancer may have more severe economic consequences for those in young and middle adulthood. If a cancer diagnosis leads to loss of employment, the economic consequences can be disastrous. Moreover, having cancer may bring increasing expenses and the fear of losing health insurance. In contrast, older adults likely accomplished their economic and developmental tasks such as purchasing a home, retiring, and raising children. Also, Medicare guarantees medical coverage and there are generally more safety nets available for the elderly (Mor et al., 1994). A recent study provides empirical evidence for these arguments and finds that people with cancer under 40 faced heightened financial strain and difficulty paying for health care compared to their older counterparts (Green and Hart-Johnson, 2010). Moreover, psychosocial oncology research routinely finds that older adults diagnosed with cancer tend to adjust better psychologically than their younger counterparts (e.g. Harrison and Maguire, 1995; Parker et al., 2003; Mosher and Danoff-Borg, 2005).

Individuals diagnosed with cancer at younger ages may witness larger increases in religiosity for several reasons. First, because off-time transitions are especially harmful to mental well-being, younger individuals with cancer may be more likely to pursue religious life as a way to cope with the practical issues precipitated by a cancer diagnosis (e.g. social and emotional support). Second, off-time transitions tend to produce higher levels of fear and anxiety of recurrence (Vickberg, 2003). Religious beliefs and practices may alleviate these fears and concerns (Holt et al., 2009). Third, older adults may have already developed the emotional resources to cope with a cancer diagnosis. Generally, older adults maintain a higher sense of emotional equanimity and resilience than their younger counterparts (Ross and Mirowsky, 2008). Fourth, developing cancer and facing the possibility of death at a younger age may elicit more "existential questions" regarding human suffering and mortality compared to their elders. For some, religion may be a source of answers to these questions.

3.3. Years-since-diagnosis and changes in religiosity

Although previous studies suggest that a cancer diagnosis is associated with increases in religiosity, researchers know little about whether religiosity changes over time after a cancer diagnosis. The negative psychological consequences of having cancer, such as fear and anxiety, may build cumulatively over time making religion even more important than after the initial diagnosis. This argument is consistent with the stress proliferation perspective advocated by Pearlin and Skaff (1996) that suggests a stressful event may be converted into other and more enduring hardships. Indeed, they underscore health problems as one specific type of stressor that is likely to lead to additional stressors over time. For instance, the fear and anxiety associated with the thoughts of recurrence of cancer may worsen over time. Moreover, the ramifications of having

cancer for an extended period of time may lead to social and economic disadvantage due to mounting medical bills or inability to work for long periods of time. To the extent that the consequences of having cancer proliferate across someone's life course, religiosity may become more important over time. Similarly, a cancer diagnosis may have altered future life transitions, such as the age one retires, creating chronic anxiety as an indirect result of having cancer.

3.4. Research questions

Our overarching hypothesis is that a cancer diagnosis leads to higher levels of religiosity. More specifically, we hypothesize that: (1) the increase in religiosity after a cancer diagnosis will be greater for younger cohorts; (2) those diagnosed at younger ages will experience larger increases in religiosity; and (3) religiosity will increase progressively with time after a cancer diagnosis.

4. Methods

To address our focal research questions, we analyze data from two waves of the National Survey of Midlife Development in the United States (MIDUS). The first wave of interviews was conducted in 1994 and 1995. The main sample included 4242 noninstitutionalized English-speaking adults aged 25–74. In addition, interviews were conducted with 951 siblings of the main participants and 1996 twins identified in the Twin Screening Project. The response rate for the MIDUS I telephone interview was 70% in the main sample. All respondents were invited to participate in a phone interview of approximately 30 min in duration and complete 2 self-administered questionnaires, each of approximately 45 pages in length. Among the telephone participants, 86.3% completed these extensive self-administered questionnaires giving an overall response rate of 60.8% ($.70 \times .86$) for both parts of the survey. A follow-up of the original MIDUS study participants was conducted between 2004 and 2006. The retention rate for the entire sample was 70%. The main sample in MIDUS II contained 2257 participants, the sibling sample included 733 siblings of the main participants, and the twin sample included 1484 twins. Self-administered questionnaires in MIDUS II were completed by 1805 main participants (80% of phone participants), 637 siblings (87% of the phone participants), and 1204 twins (81% of the phone participants). Our analysis is based on the pooled longitudinal sample of main participants, siblings, and twins who participated in the two waves of the MIDUS study and completed both phone interviews and mail questionnaires. The analytic sample in this study comprises 1694 main participants, 608 siblings, and 1141 twins with an average age of 47. Throughout all analyses, the nonindependence of observations between main participants and their siblings is taken into account by using standard errors robust to clustering of observations within families. The sample included 1947 females, 1496 males, 3237 whites, 206 non-whites, and 2498 married individuals at the first wave.

4.1. Sample attrition

Attrition related to unobserved residual changes in the response variable may produce biased estimates. To address this possibility, we conducted a probit regression analysis that revealed religiosity at baseline was positively related to the probability of participating in the follow-up. Because religiosity at baseline was predictive of being interviewed in the second waive we adjusted multivariate regression models for hazard attrition in ancillary analyses. The results of these adjusted models did not differ in any meaningful way from those presented here. Further, we conducted a detailed analysis of patterns of sample attrition among cancer patients (available upon request). Using propensity score matching, we estimated the likelihood of being retained in the sample by comparing persons who were similar on a wide variety of characteristics at baseline but differed with respect to their cancer status. Cancer patients were significantly more likely than non-cancer controls to drop out of the study due to death, yet the likelihood of nonparticipation due to reasons other than death was *lower* among cancer survivors compared to controls. In other words, persons who had cancer at baseline and survived to the follow-up were significantly more likely to participate in the study than individuals without cancer. Thus, sample attrition and, especially, selective mortality among cancer patients are unlikely to significantly bias our findings. Moreover, those lost to attrition due to mortality did not vary in their level of religiosity from those lost to attrition for other reasons.

4.2. Religiosity

We utilize two indicators of religiosity in our analyses: *religious comfort* and *religious decision making* which have been used in previous research and shown to have predictive validity (Ryff et al., 2004; King, 2003). Both of these measures were asked after a preface by the interviewer that said "Please think about what these words mean to you and answer the question with those meanings in mind." The religious comfort item was measured by asking "When you have problems or difficulties in your family, work, or personal life, how often do you seek comfort through religious or spiritual means, such as praying, meditating, attending a religious or spiritual service, or talking to a spiritual advisor?" The religious decision making item was measured by asking "When you have decisions to make in your daily life how often do you ask yourself what your religious or spiritual beliefs suggest you should do?" Responses ranged from (1) "never" to (4) "often." We analyze religious comfort and decision making, separately and as a scale ($\alpha = .86$).

4.3. Cancer

The focal predictor variable is *the presence or absence of cancer at wave II*. At both waves, the respondent was asked "have you ever had cancer?" It was coded 1 if a person has ever been diagnosed with cancer and 0 for people without a cancer diagnosis. There are three possible categories that relate to cancer diagnosis: a cancer diagnosis before wave I, a cancer diagnosis between wave I and II, and the absence of a cancer diagnosis in either wave. These variables allow us to assess if a cancer diagnosis is associated with changes in religiosity over time. In addition to the overall indicator of cancer, separate variables were created for cancer type: breast, prostate, female genitourinary cancer, and "other" cancer. Because of the limited number of cases, colon, lung, and lymphoma cancers were combined into one category. Further, a dummy indicator differentiated those with skin cancer from those with other types of cancer. Unfortunately, data were not available to measure other relevant factors related to cancer, such as stage or severity and treatment type.

Interaction terms were constructed by multiplying ever-being diagnosed with cancer by *cohort*, *age-at-diagnosis*, and *years-since-diagnosis*. Cohort was operationalized as a series of dummy variables. Three categories were created: Pre-Boom "1920–1945", Baby-Boom "1946–1964", and Post-Boom "1965+." The baby boomers will serve as the reference category. The cancer-by-cohort interaction term serves as an external moderator, while the age-at-diagnosis and years-since-diagnosis interaction terms serve as internal moderators. Internal moderators are used in cases when the effect of a variable applies only to members of a particular group (Mirowsky, 1999). An internal moderator is appropriate here because the moderating qualities of age-at-diagnosis and years-since-diagnosis will only affect the religiosity of those who experienced a cancer diagnosis.

4.4. Controls

Several controls are utilized in this study. Gender was coded 1 for *women* and 0 for *men*. Race was represented with three mutually exclusive dummy variables: *White* (reference category), *Black*, and o*ther race*. *Age* was measured in years at wave I. The categories of *education* included less than high school, high school or GED (reference category), some college, bachelor's degree, and graduate or professional degree.[1] We also included *father's education* which was measured as the highest grade completed. *Income* was the natural log of the respondent's total household income. *Marital status was* measured via three dichotomous variables: married, never married, and formerly married (reference). Parental status was assessed with a dummy indicator (1 for parents). The measure of personal mastery comprises seven items from Pearlin and Schooler's (1978) mastery scale and five other items and has been utilized in similar work (Pudrovska, 2010). Participants were asked about the extent of agreement or disagreement with statements such as "What happens in my life is often beyond my control" and "What happens to me in the future mostly depends on me." Response categories range from (1) "strongly agree" to (7) "strongly disagree." All items were averaged to create a single score (α = .84). We also control for having *no religious affiliation* at wave I. Self-reported health was measured via an item asking "In general, would you say your physical health is poor, fair, good, very good or excellent?".

4.5. Analytic plan

We employ two sets of analyses that test different dimensions of the cancer-religiosity relationship. The first analysis tests if a cancer diagnosis is positively associated with religiosity using lagged ordinal or ordinary least squares (OLS) regression modeling and the second tests if a cancer diagnosis between waves increases religiosity via fixed effects modeling.[2] Moreover, the second analysis tests the hypotheses that the effect of cancer differs by cohort, age-at-diagnosis, and years-since-diagnosis.

First, we employ *ordinal or OLS* (where appropriate) *regression models with a lagged dependent variable* to test whether or not being diagnosed with cancer between waves influences religiosity over time compared to those that were diagnosed with cancer prior to wave I and those that were never diagnosed with cancer. Model (1) compares two groups of cancer survivors to the reference group of individuals without cancer:

$$RL_{i2} = \beta_0 + \beta_1 RL_{i1} + \beta_2 Cancer1_i + \beta_3 Cancer2_i + \beta_4 X_i + \varepsilon_i \quad (1)$$

where RL_{i2} is religiosity at wave 2, β_0 is a constant, β_1 is a regression coefficient for baseline religiosity, β_2 is a regression coefficient estimating the difference in religiosity between individuals who had cancer at both waves and the reference group, β_3 is a regression coefficient estimating the difference in religiosity between individuals who had cancer only at wave 2 and the reference group (no cancer), $\beta_4 X_i$ is a vector of potential baseline confounders, and ε_i is the error term.

The biggest drawback to the lagged regression approach specified above is that it does not account for unobserved characteristics that could confound the relationship. To partially address this issue, we employ a *fixed-effects pooled time-series model* (FE). This model is useful because it accounts for all of the individual's time-invariant unobserved characteristics that may confound the association between a cancer diagnosis and religiosity, such as genetics, religiosity in childhood, personality, or childhood living conditions. Fixed effects models were calculated through the method of first-differencing,

[1] In ancillary analyses we tested if any of the proposed relationships in this study varied by race, gender, or education. We found that the results presented in this study do not vary by these status variables.

[2] Running ordinal fixed effects models resulted in the same pattern of findings in regard to the coefficient direction and significance. The interpretation of the ordinal fixed effects model is not straightforward. For this reason, we decided to show the results of the linear fixed effects model instead.

Table 1
Cancer prevalence by age: MIDUS, 1995–2005.

N	Age at wave 1	Age at wave 2	*n* (%) *Ever* diagnosed with cancer	
			Time 1	Time 2
688	20–35	30–45	11 (4.45%)	34 (7.04%)
938	36–45	46–55	36 (14.63%)	76 (15.73%)
881	46–55	56–65	66 (26.83%)	126 (26.09%)
619	56–65	66–75	77 (31.30%)	143 (29.61%)
317	66–75	76–85	56 (22.76%)	104 (21.53%)
Total				
3443	–	–	246 (100%)	483 (100%)

which is equivalent to alternative fixed effects computational methods in the two-wave case (Allison, 2009). This model can be represented with the equation:

$$Y_{it} - Y_{.i} = (\alpha_i - \alpha_i) + \beta_1(X_{it1} - X_{.t1}) + \cdots + \beta_n(X_{itn} - X_{.in}) \quad (2)$$

where Y_{it} is the religiosity outcome (both the combined and individual items) for individual i at time t; α_i is a fixed term capturing the influence of unobserved time-invariant factors related to individual i; X_{it1} denotes whether individual i reported a cancer diagnosis at time t; X_{itn}denotes the $n-1$ control variables; $Y_{.i}$, $X_{.t1}$, and $X_{.in}$ are overall means that are subtracted from a specific value at time t. Also, the fixed effects model is capable of testing for interaction effects. The fixed effects analysis will consist of four models for each dependent variable with the first testing for main effects and the remainder testing for interaction effects between a cancer diagnosis and cohort, age-at-diagnosis, and years-since-diagnosis. Eq. (3) describes the specification of a fixed effects model with an interaction term where $X_{i.2}$ represents either cohort, age-at-diagnosis, or years-since-diagnosis. Note that $X_{i.2}$ does not have a main effect because it is time invariant.

$$Y_{it} - Y_{.i} = (\alpha_i - \alpha_i) + \beta_1(X_{it1} - X_{.t1}) + \beta_2(X_{it1} - X_{.i1})(X_{i.2}) + \cdots + \beta_n(X_{itn} - X_{.in}) \quad (3)$$

5. Results

As shown in Table 1, among people who participated in both waves, 246 had cancer at baseline and 268 developed new cancer between the MIDUS waves. 31 respondents indicated ever being diagnosed with cancer at wave I but not wave II thus, the total number of people with cancer in MIDUS II was 483 (i.e. 246 − 31 + 268 = 483). As Table 1 shows, there are a sufficient number of people with cancer in different age groups to test our hypotheses. A bivariate analysis by specific cancer types (available upon request) revealed that breast, female genitourinary, skin, and lymphoma cancer were positively associated with religiosity (the composite measure). Cancers in the residual "other" and prostate categories were negatively associated with religiosity although the effects did not differ statistically from zero or from the effect of all cancers collapsed into one category. Also, the effect of cancer on religiosity for those with non-skin cancers was positive and not statistically different from the effect of the collapsed cancer category. These bivariate analyses were replicated using sex-specific models (where appropriate) which resulted in mostly the same findings.[3] The coefficient for non-skin cancers among men was negative but still did not differ from the collapsed cancer coefficient. The limited number of people in specific cancer categories precluded a detailed analysis of age-at-diagnosis, cohort, and years-since-diagnosis differences in the effects of cancer types. Therefore, all persons with cancer were combined into one category, which seems reasonable given that the main effects of different cancer types on religiosity are similar.

5.1. Changes in religiosity by cancer diagnosis

Table 2 shows how those diagnosed with cancer prior to wave I, those diagnosed between waves, and those never diagnosed with cancer differ in changes in religiosity. After adjusting for baseline levels of religiosity and sociodemographic characteristics, being diagnosed with cancer between waves was positively associated with increased religiosity over time, although the positive influence of cancer on religious decision making was not statistically different from zero. The size of the effect of developing cancer between waves was relatively large compared to other well-known predictors of religiosity such as gender and race. For all three of the dependent variables, those diagnosed with cancer prior to wave I did not differ in religiosity compared to those that were never diagnosed with cancer. Taken as a whole, this analysis suggests that a cancer diagnosis leads to a one-time increase in religiosity and does not increase over time.[4]

[3] The effect of being in the other cancer residual category was statistically different between females and males such that females witnessed larger increases in religiosity than men.

[4] This finding is also consistent with ancillary propensity score matching analyses. Because cancer is not randomly distributed in the population, estimates from regression models may be biased by the existence of confounding factors. Propensity score matching is a way to correct for this potential bias by comparing persons who have recently developed cancer and non-cancer controls that are as similar as possible. The results of propensity score matching with the controls employed in Table 2 (not shown), suggest that the average level of religiosity was larger for those that developed cancer between waves than those that did not.

Table 2
Lagged regression models of religiosity on cancer diagnosis ($N = 3443$).

	Religious comfort Model 1	Religious decision Model 2	Religiosity[a] Model 3
Religion variable at wave I	1.316***	1.402***	.684***
Female	.468***	.328***	.129***
Black	.303	.692***	.139***
Other race	.203	.387	.091
Father's education	−.019	−.010	−.005
Age	−.018***	−.009	−.006**
Born before 1946	.266*	.122	.087*
Born after 1965	−.016	.062	.010
High school	.030	−.016	.002
Some college	−.083	−.056	−.038
College graduate	.028	.066	.002
Graduate degree	.072	.039	−.002
Natural log household income	.001	−.013	−.004
Married	.157*	.086	.053
Never married	.157	.223	.072
Parent	.178	.166	.046
No religious preference	−.712***	−.718***	−.198***
Sense of control	.001	.020	−.011
Self-reported health	−.003	−.042	−.011
Cancer between waves	.530[b]***	.199	.126[b]***
Cancer prior to wave I	.072	−.076	.001
Constant	–	–	.184
R^2	–	–	.537

[a] Religious comfort + Religious decision making ($\alpha = .86$). Responses for each item ranges from 1 "Never" to 4 "Often."
[b] The coefficients for "cancer between waves" and "cancer prior to wave I" are statistically different at the $p < 0.05$ level.
* $p < .05$ (one-tailed).
** $p < .01$.
*** $p < .001$.

5.2. The life course, cancer diagnosis, and changes in religiosity

Within-individual fixed-effects estimates are shown in Table 3 for religious comfort and religious decision making. This model adjusts for all unobserved time-invariant characteristics that may affect *both* the likelihood of a cancer diagnosis and religiosity and, thus, produce a spurious association between the two. It also adjusts for observed time variant covariates such as household income. Model 1 shows that a cancer diagnosis was positively associated with religious comfort. Models 2 and 4 show that the cancer by cohort and cancer by years-since-diagnosis interactions were not statistically significant.

Table 3
Fixed effects regression models of religious comfort and religious decision making on cancer ($N = 3443$).

	Religious comfort				Religious decision making			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Cancer	.152**	.260**	.177**	.163**	.004	.100	.023	.023
Parent	.095	.092	.092	.095	.143*	.141*	.141*	.143*
Sense of control	.038*	.039*	.039*	.039*	.019	.020	.019	.020
Natural log household income	−.014	−.014	−.014	−.013	−.007	−.007	−.007	−.007
Married	−.032	−.032	−.034	−−.031	−.064	−.064	−.065	−.063
Never married	−.035	−.034	−.036	−.035	−.092	−.091	−.093	−.092
Self-reported health	.007	.007	.008	.007	.018	.018	.018	.018
Cancer × Born before 1946	–	−.166	–	–	–	−.149	–	–
Cancer × Born after 1965	–	.112	–	–	–	.142	–	–
Cancer × Age at diagnosis	–	–	−.006*	–	–	–	−.005*	–
Cancer × Years since diagnosis	–	–	–	.003	–	–	–	.005
Constant	2.744***	2.746***	2.740***	2.739***	2.577***	2.579***	2.575***	2.569***
σ_u	1.039	1.039	1.039	1.039	1.018	1.019	1.017	1.017
σ_e	.656	0.656	.656	.656	.646	.646	.646	.646
N observation	6886	6886	6886	6886	6886	6886	6886	6886
N groups	3443	3443	3443	3443	3443	3443	3443	3443

Responses for each religiosity measure range from 1 "Never" to 4 "Often."
* $p < .05$ (one-tailed).
** $p < .01$.
*** $p < .001$.

Table 4
Fixed effects regression models of religiosity on cancer (N = 3443)[a].

	Model 1	Model 2	Model 3	Model 4
Cancer	.041	.130*	.061	.055
Parent	.084	.082	.082	.084
Sense of control	.026*	.026*	.026*	.026*
Log household income	−.014	−.014	−.014	−.014
Married	−.033	−.033	−.033	−.032
Never married	−.035	−.035	−.036	−.036
Self-reported health	.014	.014	.014	
Cancer × Born before 1946	–	−.136	–	–
Cancer × Born after 1965	–	.108	–	–
Cancer × Age at diagnosis	–	–	−.005**	–
Cancer × Years since diagnosis	–	–	–	.003
Constant	−.042	−.041	−.045	−.048
σ_u	.864	.865	.863	.863
σ_e	.490	.490	.490	.490
N observation	6886	6886	6886	6886
N groups	3443	3443	3443	3443

[a] Religious comfort + Religious decision making (α = .84).
* $p < .05$ (one-tailed).
** $p < .01$.
*** $p < .001$; responses from each item ranges from 1 "Never" to 4 "Often."

Model 3 shows the interaction between having cancer and age-at-diagnosis was negative and statistically significant. This finding suggests that those diagnosed at younger ages witness larger increases in religious comfort. Model 5 shows that the effect of a cancer diagnosis between waves was not associated with increases in religious decision making. Model 7 parallels that of model 3 in showing that those diagnosed with cancer at younger ages witnessed a larger increase in religious decision making. The other interactions in models 6 and 8 were not statistically significant.

Table 4 presents the fixed effects regressions based on the average of religious comfort and decision making as the dependent variable. The main effect of being diagnosed with cancer between waves was not statistically significant. Similar to the results of Table 4, however, being diagnosed with cancer at a younger age was associated with increased religiosity over time. Again, the interaction terms for cancer and cohort and years-since-diagnosis were not statistically significant.

6. Discussion

Using data from the 1994–1995 and 2004–2006 waves of the National Survey of Midlife Development, we asked: (1) Does a cancer diagnosis influence religiosity? (2) If so, how does this relationship differ by cohort, age-at-diagnosis, and years-since-diagnosis? Our findings reveal that cancer is associated with religiosity and that age-at-diagnosis is relevant for understanding this complex relationship. Taken as a whole, these findings provide compelling evidence that a cancer diagnosis can interact with the broader social environment to influence religiosity. For instance, how one's religiosity changes after a cancer diagnosis may be largely related to the social roles and norms associated with age. Notably, this is the first study to show a relationship between a cancer diagnosis and increased religiosity using prospective US national data.

One of the key findings in our study is that people diagnosed with cancer at younger ages are more likely to become more religious than their counterparts diagnosed at older ages. Off-time diagnoses may also be related to increased religiosity because the meaning of having cancer may be different for those in middle adulthood compared to older adulthood. The differential meaning placed on a major life event can impact an individual's identity and assumptions about the world and may explain why some become increasingly religious while others do not. The seventh stage of Erikson's stages of development suggests that someone's social roles and responsibilities are central to their identity during mid-life (Erikson, 1982). Hence, a cancer diagnosis earlier in life may present more of a threat to personal identity than later in life because it disrupts social life at a critical juncture in identity formation. To individuals who are battling cancer while also trying to maintain important social roles – as a parent, spouse, provider, etc. – these burdens may appear insurmountable. Following a cancer diagnosis, patients may also feel powerless about the potential recurrence or progression of cancer. For these persons, increased religiosity may involve a heightened sense of divine control, or the perception that God or some other Higher Power controls the direction, events, and outcomes of one's life (Schieman et al., 2005). Previous research indicates that feelings of divine control can be protective against psychological distress, as well as erosions in mastery and self-esteem, especially for persons occupying disadvantaged statuses (Schieman et al., 2005).

Both years-since-diagnosis and cohort were unrelated to changes in religiosity. There are at least a couple of explanations that may account for these null findings. In regards to years-since-diagnosis, there may an endogenous effect occurring such that increased religiosity leads to increased coping skills, which reduces the fear and psychological distress about recurrence and in turn reduces the need for increasing levels of religiosity. The lack of an association may also have been driven by the measurement of religiosity. Our measure only contained two items with four response categories and the distribution

tended to be skewed towards more religiosity. Given these facts, the possibility exists that ceiling effects prevented us from detecting a relationship. In other words, more fine-grained measures of religiosity may be required to detect this association.

No evidence was found for the hypothesis that later cohorts are more likely to experience increased religiosity after a cancer diagnosis. Our argument suggested that younger cohorts are likely to utilize previously latent or non-existent religious beliefs. This may still hold true, but older cohorts may witness equivalent increases in religiosity for a different reason. Because older cohorts grew up when effective cancer treatments and early detection procedures were not available they may perceive cancer as more threatening than younger cohorts. Older cohorts have been exposed from childhood through most of their adult lives to the predominant cultural discourse of cancer as a "dread disease" (Patterson, 1987). In the first half of the twentieth century, the fear of cancer was so great that it was common practice to keep cancer diagnoses secret from patients (Lusk, 2005). In accordance with this view, one study using national data found that having had cancer was more detrimental for older cohorts in regards to personal mastery than their younger counterparts (Pudrovska, 2010). To the extent that the frightening emotional valence of a cancer diagnosis persists over time for older cohorts, they may witness equivalent increases in religiosity as their younger counterparts.

Although MIDUS is one of the longitudinal social surveys with the most detailed measures of physical and mental health over time, information on certain cancer characteristics were not available, including the stage of cancer at diagnosis. If an individual's cancer was perceived to be non life-threatening at time of diagnosis, they might not go through such severe challenges to core assumptions such as thoughts about the self, the world, and the future compared to someone diagnosed with terminal cancer. There is work, however, that suggests that threat of cancer at the time of biopsy (regardless of the outcome) was enough to stimulate reflection on issues of meaning and purpose and increase religious coping. Among a sample of women biopsied for breast cancer those with either a benign or malignant diagnosis showed increased levels of religious coping over a 14 month period (Gall et al., 2009). Our argument suggests that those with the most severe forms of cancer are the most likely to have witnessed increased religiosity. Given that many people in our sample were diagnosed with non-life threatening types of cancer, our analysis likely provides a relatively conservative test of the relationship between a cancer diagnosis and religiosity.

This study has a few limitations that warrant discussion. First, our dependent variables only consisted of two global measures of religiosity. Work by Pargament and colleagues have underscored the wide array of religious coping approaches, and their diverse implications for mental and physical well-being (Pargament et al., 1998, 2000). The MIDUS data do not permit us to distinguish these fine-grained variations in religious coping styles and methods. Second, we were unable to assess treatment type or recurrence. For those that incurred an especially invasive treatment or witnessed a recurrence, cancer may elicit a different response than others. For instance, those in a later stage of cancer or those undergoing treatments with painful side effects may experience more psychological distress and consequently be more likely to develop new coping strategies including religious ones (Green and Hart-Johnson, 2010). Third, we only assessed these relationships at two points in time. The trajectory of religious change over time for cancer survivors may be much more complex than presented here. Future work should test these relationships with data from multiple points in time that allow for growth curve modeling to truly see trajectories of religious change.

This study prompts future research to address how people respond to information that makes them face the limits of their own mortality. The influence of this information likely extends to other areas of life outside of religion. Some research suggests the prospect of death results in seeking or strengthening intimate and emotional social connections (Carstensen et al., 1999), but few have examined other aspects of life such as time use, spending patterns, financial investments, or housing preferences. As suggested in this study, these responses to facing one's mortality may vary by age and the social roles that one bases their sense of self upon. Researchers should examine various types of resources that are mobilized when people face existential concerns and how these resources differ based on stage in the life course.

This study integrates sociological and psychological perspectives on the relationship between cancer and religiosity. A psychological focus on coping is combined with a sociological focus on social transformations -reflected in the experiences of birth cohorts-, and timing of lives – reflected in age-at-diagnosis and years-since-diagnosis. Moreover, while a wealth of work examines how religiosity impacts health, our study suggests that the causal arrow may point in the reverse direction such that health influences religiosity (Koenig, 2008). Because religious involvement is associated with psychological adjustment among cancer survivors, understanding how people's religiosity changes over time should remain a high priority (Musick et al., 1998). Indeed, understanding how people respond to cancer may allow us to explore how the social context gets under the skin and becomes a powerful influence on survivors' well-being.

References

Allison, Paul D., 2009. Fixed Effects Regression Models. Sage, Thousand Oaks, CA.

Benjamins, Maureen R., Trinitapoli, Jenny, Ellison, Christopher G., 2006. Religious attendance, health maintenance beliefs, and mammography utilization: findings from a nationwide survey of presbyterian women. Journal for the Scientific Study of Religion 45, 597–607.

Carstensen, Laura L., Isaacowitz, Derek M., Charles, Susan T., 1999. Taking time seriously – a theory of socioemotional selectivity. American Psychologist 54, 165–181.

Elder Jr., Glen.H., 1994. Time, human agency, and social-change – perspectives on the life-course. Social Psychology Quarterly 57, 4–15.

Erikson, Erik H., 1982. The Life Cycle Completed. Norton, NY.

Feher, Shoshanah, Maly, Rose C., 1999. Coping with breast cancer in later life: the role of religious faith. Psycho-Oncology 8, 408–416.

Ferraro, Kenneth F., Kelley-Moore, Jessica A., 2000. Religious consolation among men and women: do health problems spur seeking? Journal for the Scientific Study of Religion 39, 220–234.

Gall, Terry L., Guirguis-Younger, Manal, Charbonneau, Claire, Florack, Peggy, 2009. The trajectory of religious coping across time in response to the diagnosis of breast cancer. Psycho-Oncology 18, 1165–1178.
George, Linda K., 1993. Sociological-perspectives on life transitions. Annual Review of Sociology 19, 353–373.
Greeley, Andrew M., Hout, Michael, 1999. Americans' increasing belief in life after death: religious competition and acculturation. American Sociological Review 64, 813–835.
Green, Carmen R., Hart-Johnson, Tamera, 2010. Cancer pain: an age-based analysis. Pain Medicine 11, 1525–1536.
Greenberg, Jeff, Solomon, Sheldon, Pyszczynski, Tom, 1997. Terror management theory of self-esteem and cultural worldviews: empirical assessments and conceptual refinements. In: Zanna, M.P. (Ed.), Advances in Experimental Social Psychology. Academic Press, Florida.
Heidrich, Susan M., Forsthoff, Cynthia A., Ward, Sandra E., 1994. Psychological adjustment in adults with cancer – the self as mediator. Health Psychology 13, 346–353.
Holt, Cheryl, Caplan, Lee, Schulz, Emily, Blake, Victor, Southward, Penny, Buckner, Ayanna, Lawrence, Hope, 2009. Role of religion in cancer coping among African Americans: a qualitative examination. Psychosocial Oncology 27, 248–273.
Hout, Michael, Fischer, Claude S., 2002. Why more Americans have no religious preference. Politics and generations. American Sociological Review 67, 165–190.
Hunter, James D., 1987. Evangelicalism: The Coming Generation. IL: University of Chicago Press.
Judy, Harrison, Maguire, Peter, 1995. The influence of age on adjustment to cancer. Psycho-Oncology 4, 33–38.
Kaiser, Karen, 2008. The meaning of the survivor identity for women with breast cancer. Social Science and Medicine 67, 79–87.
King, Valerie, 2003. The influence of religion on fathers' relationships with their children. Journal of Marriage and Family 65, 382–395.
Kirkpatrick, Lee A., 2004. The evolutionary social psychology of religious beliefs. Behavioral and Brain Sciences 27, 741.
Koenig, Harold G., 2008. Medicine, Religion, and Health: Where Science and Spirituality Meet. Templeton Foundation Press, West Conshohocken, PA.
Lachapelle, Diana, Hadjistavropoulos, Thomas, 2005. Age-related differences among adults coping with pain: evaluation of a developmental life-context model. Canadian Journal of Behavioral Science 37, 123–137.
Lazarus, Richard S., Launier, Raymond, 1978. Stress-related transactions between person and environment. In: Pervin, Lawrence A., Lewis, Michael (Eds.), Perspectives in Interactional Psychology. Plenum, New York, pp. 287–327.
Lee, Virginia, Cohen, Robin S., Edgar, Linda, Laizner, Andrea M., Gagnon, Anita J., 2006. Meaning-making intervention during breast or colorectal cancer treatment improves self-esteem, optimism, and self-efficacy. Social Science and Medicine 62, 3133–3145.
Lesthaeghe, Ron J., 1995. The second demographic transition in western countries: an interpretation. In: Mason, Karen O., Jensen, An-Magritt (Eds.), Gender and Family Change in Industrialized Countries. Oxford University Press, Oxford, pp. 17–62.
Lusk, B., 2005. Prelude to specialization: U.S. cancer nursing, 1920–50. Nursing Inquiry 12, 269–277.
Mirowsky, John, 1999. Analyzing associations between mental health and social circumstances. In: Aneshensel, Carol, Phelan, Jo C. (Eds.), Handbook of the Sociology of Mental Health. Kluwer, New York, pp. 105–123.
Mor, Vincent, Allen, Susan, Malin, Maureen, 1994. The psychosocial impact of cancer on older versus younger patients and their families. Cancer 74, 2118–2127.
Moschella, Vincent D., Pressman, Kristin R., Pressman, Peter, Weissman, David E., 1997. The problem of theodicy and religious response to cancer. Journal of Religion and Health 36, 17–20.
Mosher, Catherine E., Danoff-Burg, Sharon, 2005. A review of age differences in psychological adjustment to breast cancer. Journal of Psychosocial Oncology 23, 101–114.
Musick, Marc A., Koenig, Harold G., Hays, Judith, Cohen, Harvey, 1998. Religious activity and depression among community-dwelling elderly persons with cancer: the moderating effect of race. Journal of Gerontology: Social Sciences 53, S1–S10.
Pargament, Kenneth I., Smith, Bruce W., Koenig, Harold G., Perez, Lisa M., 1998. Patterns of positive and negative religious coping with major life stressors. Journal for the Scientific Study of Religion 37, 710–724.
Pargament, Kenneth I., Koenig, Harold G., Perez, Lisa M., 2000. The many methods of religious coping: development and initial validation of the RCOPE. Journal of Clinical Psychology 56, 519–543.
Parker, P.A., Baile, W.F., et al, 2003. Psychosocial and demographic predictors of quality of life in a large sample of cancer patients. Psychosocial Oncology 12, 183–193.
Patterson, James T., 1987. The Dread Disease: Cancer and Modern American Culture. Harvard University Press, Cambridge, MA.
Pearlin, Leonard I., Schooler, C., 1978. The structure of coping. Journal of Health and Social Behavior 18, 2–21.
Pearlin, Leonard I., Skaff, Marilyn M., 1996. Stress and the life course: a paradigmatic alliance. Gerontologist 36, 239–247.
Pollner, Melvin, 1989. Divine relations, social-relations, and well-being. Journal of Health and Social Behavior 30, 92–104.
Pudrovska, Tetyana, 2010. Cancer and mastery: do age and cohort matter? Social Science and Medicine 71, 1285–1291.
Roof, Wade C., 2000. Spiritual Marketplace. Princeton University Press, Princeton, NJ.
Ross, Catherine E., Mirowsky, John, 2008. Age and the balance of emotions. Social Science and Medicine 66, 2391–2400.
Ryder, Norman B., 1965. The cohort as a concept in the study of social-change. American Sociological Review 30, 843–861.
Ryff, Carol D., Singer, Burt H., Palmersheim, K.A., 2004. Social inequalities in health and well-being: the role of relational and religious protective factors. In: Brim, O.G., Ryff, Carol D., Kessler, Ronald C. (Eds.), How Healthy are We?: A National Study of Well-Being at Midlife. University of Chicago, Illinois, pp. 90–123.
Schieman, Scott, Pudrovska, Tetyana, Milkie, Melissa A., 2005. The sense of divine control and the self-concept – a study of race differences in late life. Research on Aging 27, 165–196.
Schieman, Scott, Bierman, Alex, Ellison, Christopher G., 2010. Religious involvement, beliefs about god, and the sense of mattering among older adults. Journal for the Scientific Study of Religion 49, 517–535.
Sherkat, Darren E., 2008. Beyond belief: atheism, agnosticism, and theistic certainty in the United States. Sociological Spectrum 28, 438–459.
Vickberg, Suzanne M.J., 2003. The concerns about recurrence scale (CARS): a systematic measure of women's fears about the possibility of breast cancer recurrence. Annals of Behavioral Medicine 25, 16–24.
Wink, Paul, Scott, Julia, 2005. Does religiousness buffer against the fear of death and dying in late adulthood? Findings from a longitudinal study. Journals of Gerontology Series B—Psychological Sciences and Social Sciences 60, 207–214.