Journal of Religion and Health (2021) 60:420–443
https://doi.org/10.1007/s10943-019-00936-1

ORIGINAL PAPER

Does Childhood Religiosity Delay Death?

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Published online: 25 October 2019

Abstract

This study explores the potential long-term health effects of religiosity in the childhood home. Analyses use retrospective childhood data from the MIDUS survey linked to National Death Index records from 1995 to 2014. Findings from Cox proportional hazard models suggest that children brought up in highly religious households have a higher risk of mortality than those socialized in more moderately religious households, this despite such individuals having better overall health profiles. The surprising link between high childhood religiosity and mortality was confined to those who downgraded their religiosity. Those who intensified from moderate to high religiosity, in fact, seemed to be most protected. We call for future research to more clearly specify the intervening mechanisms linking childhood religion with adult health and mortality over the life course.

Keywords Religiosity · Socialization · Health behaviors · Life course · Mortality

Introduction

Research on the life course reveals that childhood conditions leave a lasting impact on people's health as they age. Commonly studied early-life exposures include socioeconomic position, family structure, and trauma, and prior research links these factors to a variety of outcomes such as adult morbidity (Marmot et al. 2001), obesity (Gustafson and Sarwer 2004), functional health (Guralnik et al. 2006), and mortality (Hayward and Gorman 2004).

One overlooked factor that could influence later-life health is exposure to religiosity in the childhood home. Religion is a core aspect of young people's socialization (Pearce et al. 2019), shaping many of the beliefs and behavioral dispositions that protect or threaten their long-term well-being. Scholars observe that religion is

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a powerful mechanism of social control; through both internalized beliefs and the compulsion of faith communities, it promotes activities such as spending time with family while discouraging behaviors such as substance abuse (Haber et al. 2012; Mahoney et al. 2003). These features of religion appear to extend life. Across many studies using various national and regional samples (Hummer et al. 1999; Kim et al. 2015; La Cour et al. 2006; Musick et al. 2004; Strawbridge et al. 1997), high religiosity is consistently related to lower all-cause mortality. That said, existing evidence speaks primarily to the protectiveness of adult religiosity. Do early religious exposures also predict reduced mortality risk? Addressing this question will help us meet a long-standing call in the field of religion and health to "measure religious involvement in a life-course fashion" (Hummer et al. 2010: 288). This study attempts to fill this important gap with survey data from the National Survey of Midlife Development in the United States (MIDUS) linked to mortality records in the National Death Index.

Literature Review

There are several reasons that lead us to hypothesize that childhood religiosity should be inversely associated with mortality risk. One line of evidence, informed by research at the intersection of religion and family, points to a direct and lasting effect of childhood religious exposures on adult mortality. Childhood is often conceived by life-course scholars as a "sensitive period" (Kuh et al. 2003) that has indelible imprints on people's lives, independent of intervening experiences in adulthood (Keating and Hertzman 1999). Religious families may provide at this critical stage of development an environment especially conducive to good future health. For instance, religious homes emphasize the centrality of family life and place a high priority on fostering close and involved relationships with children (Mahoney et al. 2003; Mahoney 2010). This sense of family cohesion is often reinforced in religious communities through explicit teaching, peer influence, and social control (Wilcox 2002). Shared religious involvement may also foster greater psychological and spiritual closeness between parents and adolescents (Petts 2014; Wen 2014). Taken together, this package of resources present during early life may provide an optimal developmental context related to longevity. Indeed, longitudinal evidence suggests that perceptions of parental warmth and cohesive family environments during childhood tend to be associated with better adult physical health because they promote adaptive responses to stress (Russek and Schwartz 1997; Luecken et al. 2006, 2013).

While the lasting impact of early familial conditions could directly influence mortality, childhood religiosity could also spur a chain of subsequent life circumstances that *indirectly* influence later-life health. This line of reasoning suggests that any effects of early religious exposure may be transmitted in large part through downstream intervening variables that occur later in life (Keating and Hertzman 1999). Adulthood religiosity is one such candidate mechanism. Children raised in highly religious homes are more likely to remain religious as adults. Considerable evidence corroborates the continuity of religious belief and practice across the life course

(e.g., Krause and Ellison 2007; Myers 1996; Wink and Dillon 2002), despite a fair degree of denominational switching within broad faith traditions (e.g., Hoge et al. 1995). The benefits of early-life religious exposure may become manifest later on in the life course by increasing the likelihood of continued religious practice, where health benefits may be fully realized. Indeed, a vast body of research suggests that higher adulthood religiosity predicts later mortality (e.g., Hummer et al. 1999, 2010; Musick et al. 2004). Thus, any life-elongating effects of early religiosity might be attributed to higher rates of religiosity among adults raised in such circumstances.

Though the presence of adult religiosity may mediate the effects of early religious exposures, the importance of childhood religiosity for later-life mortality could alternatively be explained by particular combinations of childhood and adulthood religious circumstances. These combinatorial pathway patterns could be cumulative (high childhood religiosity + high adulthood religiosity = greater longevity), but they could also be nonadditive. Put differently, there may be complex contingencies between childhood and adulthood religiosity that arise because of specific religious exposures over the life course. Though evidence is sparse, the continuity of high religiosity over time may offer the greatest returns to long-term health. A recent study of adult women suggests that attending religious services on a weekly basis at two time points, measured 4 years apart, reduced the risk of all-cause, cardiovascular, and cancer mortality relative to attending weekly at only one time point or attending less frequently over time (Li et al. 2016). Previous research also suggests that those who decline in religiosity experience poorer health and well-being than the consistently religious and non-religious (Fenelon and Danielsen 2016). On the other hand, increases in religiosity may promote better health by providing a sense of life purpose and equipping individuals with better coping methods to deal with stressors (Koenig et al. 2012). Existing studies, however, only consider short-term religious change during periods of adolescence, early adulthood, or later adulthood (e.g., Desmond et al. 2010; Fletcher and Kumar 2014; Ingersoll-Dayton et al. 2002; Petts 2009; Uecker et al. 2007). We have little knowledge about how changes in religiosity from early childhood to midlife influence health, so we also consider this question in our analysis.

Health behaviors are a second intervening variable through which early-life religious exposures may lower adult mortality risk. This particular explanation has been widely studied with respect to adult religiosity and longevity (Koenig et al. 2012). Extant evidence shows that relative to the non-religious, religious adults smoke and drink less (Garcia et al. 2013; Klemmack et al. 2007) and exercise more (Strawbridge et al. 1997). Religious individuals are also more likely than the non-religious to engage in preventative health behaviors, such as getting regular mammograms (Benjamins et al. 2006) and cholesterol screenings (Benjamins 2005). More specific to the current study, research by Hummer et al. (2010) suggests that the effect of religious involvement on mortality is partially mediated by health behaviors, as demonstrated by a reduced hazard ratio upon including these mechanisms in a statistical model (see also Musick et al. 2004; Strawbridge et al. 1997). Surprisingly, however, no study has yet focused on whether the healthy lifestyles associated with adult religiosity are ultimately set in motion during childhood through early-life religious exposure.

Childhood religion may have a formative impact on health socialization, and such behavioral dispositions could extend into adulthood and ultimately shape longevity. As Singh-Manoux and Marmot (2005: 2130) note, "[h]ealth-related…behaviors are never truly 'voluntary'; they are a product of, and embedded in structures of society." Religion is one such structure that directs parenting practices and that is highly relevant for issues related to health. Some evidence suggests, for instance, that children raised in highly religious homes are least likely to initiate cigarette, alcohol, and drug use (e.g., Kim-Spoon et al. 2014; Nonnemaker et al. 2006). Given that adult health lifestyles are often established in adolescence (Chassin et al. 1996), there is a strong possibility that being raised in a religious home may cement a healthful lifestyle *prior to* the assumed effect that adult religious commitments would have on such behaviors.

Though religion in the childhood home may have a lasting impact on health behaviors regardless of adulthood religiosity, it is also possible that only sustained religion is linked to the healthy lifestyles ultimately associated with lower risk of death. In any event, health behaviors—whether set into motion either by initial religious socialization, or those that fit with the religious direction of people's lives as adults—should be a mechanism through which early-life religious exposure lowers mortality risk.

Methods

Data

Data for this study come from the National Survey of Midlife Development in the United States (MIDUS), a sample of 3032 English-speaking, non-institutionalized adults who were 25–74 years of age when the study was launched in 1995. Data collection was conducted in two phases: first, random-digit dialing was used to obtain a sampling frame. The telephone survey had a 70% response rate. Second, mail-back questionnaires were sent to those who completed the telephone interview (86.6% response rate). The overall response rate was 61% (.87 × .70).

Analyses use the MIDUS sampling weights to adjust for selection probabilities and non-response to ensure that the sample is representative of the US population. The unweighted MIDUS sample resembles population characteristics drawn from the 1995 Current Population Survey with respect to marital status, region, city size, age, and sex (Rossi 2001). Looking at racial composition, 84.8% of the US population was White and 11.2% was Black, compared with figures of 87% White and 7% Black in our unweighted MIDUS analytic sample. The largest discrepancy between the US population in 1995 and MIDUS, however, is found for education level: 47.8% of the American population had more than 12 years of education, while this figure increases to 60% in our MIDUS analytic sample. Moreover, among the American population in 1995, 15.8% had fewer than 12 years of education, compared to only 10% of the MIDUS sample. This overrepresentation of educated individuals may be a function of the high degree of literacy needed to complete the lengthy questionnaire required of MIDUS participants (see Rossi 2001).

Measures

Dependent Variable

We examine time to death (measured in months), from the 1995 survey up until December 2014. MIDUS respondents were linked to National Death Index (NDI) records during this period. Only all-cause mortality records are available in the NDI data linked to MIDUS.

Religious Importance in Childhood Home

To assess childhood religiosity, respondents were asked, "How important was religion in your home when you were growing up?" Response options were: (1) "Very important," (2) "Somewhat important," and (3) "Not very important," and "Not at all important," combined into one category to obtain adequate cell sizes. We use the secondary category "Somewhat important" as our reference category to emphasize how high levels of religious exposures and no religious exposures may each differ from more nominal religious commitments in the family.

Recognizing the limitations of using a retrospective measure of childhood religiosity, we undertook several analyses to examine the validity of such reports. For this, we relied on a separate subsample of twins featured in the larger MIDUS project who were administered the same survey protocol as the national sample. There was a moderately high correspondence between twin reports of religiosity in their childhood home (72%), a level similar to that of conventionally accepted retrospective measures such as parental education (also coded in three categories: college degree, high school degree no college, and less than high school degree, 71%) (see Ward 2011). We further conducted twin fixed-effects analysis to see whether discrepancies in childhood religiosity reports were associated with achieved adult characteristics (e.g., religiosity). These results (available upon request) indicated that recollections of childhood religious importance among twins—which, with perfect measurement, should not differ from one to the other—did vary by several measures of adulthood religiosity. This suggests that certain dimensions of present religiosity may color one's perceptions of the religious past, and we took each of these variables into account in multivariable models.[1]

[1] An aspect of adulthood religiosity found to significantly predict childhood reports of religious importance in fixed-effects twin models and included in our main statistical analysis was religious importance (ranging from "not at all" to "very important"). The pattern of twin differences suggests that relatively less religious adults tend to report childhood religion as more central to their family than do the most highly religious adults. Several other correlated variables were also significant in fixed-effects twin models when religious importance was excluded; these include how important spirituality is for the respondent and how spiritual they believe they are (both ranging from "not at all" to "very important), and the frequency of relying on religion for comfort or in their daily activities (both coded from "never" to "often"). For the sake of parsimony, we do not retain these final three variables in our analysis, because results were unchanged with their inclusion.

Adulthood Religiosity was assessed through three different measures. First, we considered respondents' religious attendance. Participants were asked about the frequency they "usually attend religious or spiritual services." This was coded as a categorical variable with the following categories: (0) "never," (1) "less than once a month," (2) "one to three times a month," (3) "about once a week," and (4) "more than once a week." We also included a variable that assesses religious importance in adulthood, which asks respondents, "How important is religion in your life?" (1 = "Not at all" and "Not very important," 2 = "Somewhat important," and 3 = "Very important"). To maintain consistency with our measure of childhood religiosity, "somewhat important" served as our reference category.

Negative Health Behaviors were assessed by asking respondents whether they had used "any of the following substances on your own" (i.e., without a medical prescription) within the past year: crack, heroin, LSD, weed, nitrates, sedatives, stimulants, nerve pills, painkillers, Prozac, and inhalants (1 = Yes to any, 0 = No). We also included a variable of whether the respondent reported that their drinking affected their work/school in the past year, as well as whether the respondent was a former smoker, or a current smoker ("never smoked" serves as the reference category).

Positive Health Behaviors included a measure of monthly frequency of both moderate and vigorous exercise (range = 0–27 days), along with a dichotomous variable of whether the respondent had seen a doctor in the last year for routine medical care (0 = No, 1 = Yes).

Though the presumed pathway from childhood religion to mortality involves health behaviors, we recognize that many chronic conditions and comprehensive aspects of health are affected by health behavioral patterns for which we lack direct measures. Because these aspects of health are themselves key predictors of mortality, we also consider several indicators of health status in our analysis. We included a series of dichotomous variables to denote whether the respondent had experienced high blood pressure, lung problems, heart problems, stroke, diabetes, and cancer (except skin cancer, which is typically non-lethal). These are considered "serious" health conditions (see Ferraro and Farmer 1999) and present the most acute risk of death. Physical and mental health were both measured using self-rated Likert scales ranging from "poor" to "excellent." Respondents' body-mass index (BMI) was measured using a categorical variable ranging from underweight (BMI < 18.5) to obese class III (BMI ≥ 40), with the normal weight range (18.5 ≤ BMI < 25) as the reference category.

Additional Covariates

Demographic Covariates measured at baseline include the respondent's age (in years) and age^2, to model potential nonlinear effects of age on mortality. We also adjust for gender (male = 1, female = 0) and race/ethnicity (White = ref, Black, non-Hispanic, Hispanic, and Other, Non-Hispanic). In selected analyses, we also adjust for several adulthood achieved characteristics, including marital status (married or in marriage-like partnership = 1, other = 0), respondent's education, coded as less than a high school degree (reference), a high school degree or equivalent, some college, or a university degree, and household income, adjusted for the number of adults

aged 18 and over in the household. Accounting for these adulthood characteristics helps to minimize the possibility of confounding between our pathway variables and the mortality outcome. To adjust for the non-normality of the income variable, we categorized the household-size adjusted income into quintiles.

We also adjust for several additional *childhood covariates* that could be correlated with household religiosity and also influence later mortality. We include a measure of parental education, which was measured for the head of the family (usually the father, with mother's education used when father's education was missing); here, less than high school education was the reference category, contrasted with a high school degree or equivalent, some college, or a university degree. Analyses also feature measures of the childhood area in which the respondent lived (0 for "rural and small" town (1) for medium-sized town, suburbs, and city),[2] parental divorce prior to age 16 (1 = yes, 0 = no), and whether the family was on welfare at any point during one's childhood (1 = yes, 0 = no). Parental emotional abuse was a measure of how often the respondent's mother and father "insulted or swore at them, sulked or refused to talk to them, stomped out of the room, did or said something to spite them, threatened to hit them, and smashed or kicked something in anger" (coded from 1 = "Never" to 4 = "Often"), averaged over the two parents to create an index ($\alpha = 0.70$). Parental physical abuse was a scale consisting of two items pertaining to the respondent's mother and two to the respondent's father. The first item measured moderate physical abuse and asked respondents to consider how often each parent "grabbed or showed them, slapped them, or threw something at them." The second item gauged severe physical abuse and asked respondents to consider how often each parent "kicked, bit, or hit them with a fist; hit or tried to hit them with something; beat them up, choked them, or burned or scalded them." We averaged these four scores into a variable of physical abuse ($\alpha = 0.84$).

Finally, analyses consider a measure of parental affection during childhood. Maternal and paternal affection were assessed separately and consisted of retrospective questions about the extent of warmth in the relationship, including the extent to which the parent understood problems and worries, could be confided in, showed love and affection, devoted time and attention to the child, gave effort in their upbringing, and taught them about life. Responses were averaged for each parent and ranged from 1 = "not at all" to 4 = "a lot." We averaged the scores across both scales (mother and father), or used the other scale mean when scores for one parent were missing (alphas above .90 for individual parent scales).

Descriptive statistics for these covariates, along with all other study variables, are presented in Table 1.

[2] Additional analyses also incorporated a measure of respondent's current region of residence (Midwest, South, Northeast, and West), as childhood census region was unfortunately not available in the MIDUS data. Results were unchanged with the inclusion of this variable, so we excluded it from final analyses.

Table 1 Descriptive statistics, MIDUS ($n = 3031$; all results weighted; where applicable, standard deviations shown in parentheses)

Variable	Variable range	Mean/proportion
Religious importance in childhood home		
Very important		0.44
Somewhat important		0.36
Not at all important		0.20
Demographic covariates		
Age	21–74	46.13 (13.10)
Male		0.43
Race		0.85
White, non-Hispanic		0.87
Black, non-Hispanic		0.07
Hispanic		0.03
Non-Hispanic, other		0.03
Childhood covariates		
Parental education		
Less than high school		0.44
High school education or equivalent		0.29
Some college education		0.08
University degree or higher		0.19
Parental affection	1–4	2.98 (0.66)
Parents on welfare		0.08
Emotional abuse	1–4	2.18 (1.20)
Physical abuse	1–4	1.79 (1.06)
Urban childhood residence		0.48
Adulthood achieved characteristics		
Married		0.68
Respondent education		
Less than high school		0.13
High school or equivalent		0.38
Some college education		0.26
University degree or higher		0.23
Household income adulthood		
Quintile 1		0.25
Quintile 2		0.22
Quintile 3		0.20
Quintile 4		0.17
Quintile 5		0.16
Adulthood religiosity		
Religious attendance (adult)		
Never attend		0.21
Less than once a month		0.29
One to three times a month		0.13
About once a week		0.25

Table 1 (continued)

Variable	Variable range	Mean/proportion
More than once a week		0.13
Religious importance (adult)		
Very important		0.37
Somewhat important		0.36
Not at all important		0.24
Adulthood health		
Health conditions		
Cancer		0.01
High blood pressure		0.18
Heart problems		0.12
Lung problems		0.15
Diabetes		0.06
Stroke		0.01
Physical health		
Poor		0.03
Fair		0.13
Good		0.36
Very good		0.33
Excellent		0.14
Mental health		
Poor		0.01
Fair		0.09
Good		0.34
Very good		0.34
Excellent		0.23
BMI		
Underweight		0.02
Normal weight		0.38
Overweight		0.34
Obese class I		0.14
Obese class II		0.04
Obese class III		0.08
Health behaviors		
Negative health behaviors		
Ever used drugs		0.15
Drinking affects work/school		0.10
Former smoker		0.29
Current smoker		0.24
Positive health behaviors		
Exercise frequency	0–27	14.61 (8.72)
Visited a doctor	0–1	0.70

Analysis

We conducted a series of Cox proportional hazard models. Approximately 19% of the baseline sample died over the course of the 19-year study period ($n = 586$), leaving 2445 respondents censored. Analyses revealed that the assumption of proportional hazards held.

Cox models employed multiple imputation using chained equations (MICE) to deal with missing data (Royston 2005) ($m = 20$).[3] We included our dependent variables in the imputation models, but then excluded cases missing on the dependent variable from all analyses (von Hippel 2007). This procedure yielded 3031 cases for analysis. A list of the number of missing cases for all variables used in the analysis can be found in "Appendix".

Results

Descriptive statistics shown in Table 1 indicate that "high" household religiosity was the most commonly recalled level from childhood (44%). Just over a third of respondents recalled moderate religiosity, while one in five said that religion was "not very" or "not at all important." Current (adulthood) levels of religious importance were slightly more subdued, as only 37% saw religion as "very important." About 38% of the sample reported going to church at least weekly.

A total of 586 individuals died during the study period. Specific to the childhood religion category, 21.33% of those raised in highly religious homes died during the study period ($n = 285$), compared to 18.60% and 16.19% of those coming from homes moderately religious and not religious, respectively ($n = 204$ and $n = 97$).

The Cox proportional hazard models in Table 2 begin by assessing the association of childhood religiosity with mortality without adjustment for controls to give an overall picture of this relationship. Model 1 shows that relative to the moderately religious, those growing up in highly religious homes are at greater risk of mortality (HR = 1.24, $p < .05$).

A bivariate model of childhood religiosity and mortality can be misleading; however, childhood religiosity is almost certainly confounded with factors such as age/cohort and race/ethnicity, along with many other additional traits of the childhood home. Model 2 of Table 2 accounts for these types of covariates by adjusting for age, gender, race/ethnicity,[4] and several childhood conditions. Again, contrary to the argument that high childhood religiosity is most protective against mortality risk, Model 2 still shows that those reporting the highest levels had elevated rates of mortality compared to those in moderately religious homes

[3] Results were substantively similar using listwise deletion to handle missing data.

[4] At a reviewer's request, we conducted analyses that considered only White, non-Hispanic respondents ($n = 2637$). The results were substantively similar, likely because 87% of the full sample comprised this category. We retain the full sample in our analysis, however, so as to maximize the number of cases we have available, and because race was not a focal point of our analysis.

Table 2 Cox proportional hazards predicting mortality (1995–2014) (hazard ratios shown, 95% confidence intervals shown in brackets, $n = 3031$)

	Model 1	Model 2	Model 3	Model 4	Model 5
Religious importance in childhood home					
Very important[a]	1.24* (1.00–1.54)	1.25* (0.99–1.57)	1.30* (1.03–1.64)	1.34* (1.06–1.70)	1.38** (1.08–1.75)
Not at all important[a]	1.11 (0.84–1.47)	1.17 (0.87–1.57)	1.16 (0.87–1.56)	1.10 (0.82–1.48)	1.10 (0.83–1.47)
Demographic covariates					
Age		1.08* (1.00–1.16)	1.10* (1.02–1.19)	1.10* (1.02–1.18)	1.05 (0.97–1.13)
Age^2		1.00 (0.99–1.00)	1.00 (0.99–1.00)	1.00 (0.99–1.00)	1.00 (0.99 –1.00)
Male		1.04 (0.81–1.23)	1.11 (0.89–1.40)	1.07 (0.85–1.35)	1.14 (0.90–1.44)
Race					
Black, non-Hispanic[b]		1.10 (0.78–1.53)	0.91 (0.65–1.28)	0.95 (0.68–1.34)	1.09 (0.80–1.48)
Hispanic[b]		0.55† (0.29–1.02)	0.43* (0.21–0.88)	0.44* (0.23–0.85)	0.29** (0.13–0.62)
Other[b]		0.51† (0.25–1.07)	0.45† (0.19–1.03)	0.45† (0.19–1.04)	0.36** (0.16–0.77)
Childhood covariates					
Parental education					
High school education or equivalent[c]		1.06 (0.84–1.33)	1.13 (0.90–1.42)	1.12 (0.88–1.41)	1.02 (0.79–1.31)
Some college education[c]		1.14 (0.76–1.73)	1.40 (0.93–2.10)	1.41 (0.93–2.12)	1.56† (0.99–2.47)
University degree or higher[c]		1.03 (0.78–1.38)	1.02 (0.74–1.39)	1.02 (0.76–1.36)	0.87 (0.65–1.16)
Parental divorce		1.03 (0.79–1.35)	0.95 (0.73–1.23)	0.95 (0.74–1.22)	0.87 (0.66–1.14)
Parental affection		1.11 (0.99– 1.26)	1.10 (0.96–1.24)	1.10 (0.98–1.25)	1.11 (0.98–1.26)
Parents on welfare		1.50* (1.10–2.05)	1.43* (1.05–1.96)	1.43* (1.04–1.97)	1.17 (0.80–1.71)
Emotional abuse		1.02 (0.93–1.13)	1.00 (0.90–1.11)	0.99 (0.90–1.10)	0.94 (0.85–1.04)
Physical abuse		1.02 (0.91–1.15)	1.00 (0.89–1.12)	1.01 (0.90–1.14)	1.08 (0.97–1.20)
Urban childhood residence		1.06 (0.83–1.36)	1.15 (0.90–1.46)	1.11 (0.87–1.43)	1.11 (0.88–1.40)
Adulthood achieved characteristics					
Married			0.86 (0.69–1.06)	0.88 (0.71–1.08)	0.92 (0.73–1.15)

Table 2 (continued)

	Model 1	Model 2	Model 3	Model 4	Model 5
Respondent education					
High school education or equivalent[d]			0.79 (0.59–1.07)	0.80 (0.59–1.07)	0.77 (0.58–1.11)
Some college education[d]			0.84 (0.62–1.15)	0.85 (0.62–1.15)	0.82 (0.60–1.12)
University degree or higher[d]			0.68* (0.50–0.95)	0.72* (0.52–1.00)	0.80 (0.57–1.13)
Household income (adulthood)					
Quintile 2[e]			0.69* (0.51–0.96)	0.70* (0.51–0.96)	0.81 (0.59–1.11)
Quintile 3[e]			0.55*** (0.40–0.75)	0.57** (0.42–0.78)	0.63** (0.46–0.86)
Quintile 4[e]			0.75† (0.55–1.03)	0.77† (0.57–1.05)	0.84 (0.61–1.14)
Quintile 5[e]			0.58*** 0.43–0.78)	0.59*** (0.43–0.79)	0.72* (0.52–0.99)
Adulthood religiosity					
Religious attendance (adult)					
Less than once a month[f]				0.77† (0.59–1.01)	0.87 (0.65–1.15)
One to three times a month[f]				0.86 (0.58–1.28)	1.01 (0.69–1.48)
About once a week[f]				0.77† (0.57–1.05)	0.92 (0.65–1.30)
More than once a week[f]				0.76 (0.50–1.14)	1.05 (0.68–1.62)
Religious importance (adult)					
Very important[g]				0.86 (0.67–1.10)	0.79 (0.60–1.04)
Not at all important[g]				0.95 (0.73–1.23)	1.19 (0.90–1.58)
Adulthood health					
Health conditions					
Had cancer					1.74 (0.70–4.30)
High blood pressure					1.25 (1.00–1.56)
Heart problems					1.68*** (1.32–2.13)
Lung problems					1.00 (0.76–1.32)
Diabetes					1.40* (1.04–1.87)
Stroke					0.81 (0.47–1.38)

Table 2 (continued)

	Model 1	Model 2	Model 3	Model 4	Model 5
Physical health					
Fair[h]					0.62* (0.39–0.98)
Good[h]					0.47** (0.29–0.77)
Very good[h]					0.36*** (0.21–0.60)
Excellent[h]					0.31*** (0.17–0.57)
Mental health					
Fair[i]					1.59 (0.65–3.91)
Good[i]					1.55 (0.65–3.71)
Very good[i]					2.01 (0.82–4.89)
Excellent[i]					2.04 (0.83–5.03)
BMI					
Underweight[j]					2.04[†] (0.95–4.39)
Overweight[j]					0.82[†] (0.62–1.06)
Obese class I[j]					0.97 (0.71–1.33)
Obese class II[j]					0.97 (0.59– 1.59)
Obese class III[j]					0.98 (0.67–1.44
Health behaviors					
Negative health behaviors					
Ever used drugs					1.24 (0.83–1.86)
Drinking affects work/school					0.97 (0.60–1.55)
Former smoker					0.90 (0.69–1.16)
Current smoker					1.28* (1.02–1.68)
Positive health behaviors					
Exercise frequency					0.98** (0.97–1.00)
Visited a doctor					0.84 (0.66–1.07)

Table 2 (continued)

[a]Reference category is somewhat important

[b]Reference category is White, non-Hispanic

[c]Reference category is less than a high school education

[d]Reference category is less than a high school education

[e]Reference category is the lowest income quintile (Quintile 1)

[f]Reference category is never attends religious services

[g]Reference category is religion is somewhat important in adulthood

[h]Reference category is poor physical health

[i]Reference category is poor mental health

[j]Reference category is in the normal (healthy) BMI range

$^{***}p < .001$, $^{**}p < .01$, $^{*}p < .05$, $^{\dagger}p < .10$

(HR = 1.25, $p < .05$). In additional analyses, we shifted the reference category to low/non-religious childhood religion to test for any differences between this group and those recalling high religiosity; the hazard ratio for this comparison failed to reach conventional levels of statistical significance ($p = .670$). Relative to the non-religious, the moderately religious also did not have a significantly different mortality risk. Among the other covariates included in Model 2, age and having been on welfare during childhood were associated with higher mortality risk.

Model 3 extends the initial Cox model, but also adds baseline values for respondent marital status, education, and household income. These are adult characteristics that are expected to influence mortality risk. Here again, those raised in highly religious childhood homes were at an increased mortality risk relative to those growing up in religiously moderate households (HR = 1.30, $p < .05$). Other associations shown in Model 2 likewise remained unchanged. Those with a bachelor's degree or higher were at a lower risk of mortality compared to individuals with less than a high school education (HR = 0.68, $p < .05$). In addition, relative to the lowest household income quintile, all higher quintiles had a lower mortality risk.

We next assess the results concerning adult religiosity and health behaviors/conditions in the link between early religious exposures and mortality. These factors are included in subsequent models (4 and 5) under the assumption that childhood religious socialization shapes characteristics of adult religion, but that the most proximal determinant of death is likely to be those health factors influenced by religion at both or either point in the life course. Models 1, 2, and 3, however, have already cast doubt on a pathway process, given that the childhood religious conditions hypothesized to produce the most healthful lifestyles—high importance of religion in the home—do not appear protective. And indeed, there is no evidence that the inclusion of adult religiosity or a wide array of health-related variables change our understanding of this focal relationship shown in simpler models. The hazard ratio remains statistically significant and actually increases in size once the full set of covariates is taken into account in Model 5 (HR = 1.38, $p < .01$), suggesting that were it not for their relatively higher levels of adult religiosity and their generally positive health profile, those with high early religious exposures would

fare even worse relative to the reference group. Additional analyses (not shown) also included a number of additional possible pathway variables, including self-efficacy, social support received in the past year, and adult marital instability. Results were unchanged with the inclusion of these variables.

Unsurprisingly, having a heart problem at baseline, smoking, and reporting worse overall self-reported physical health were associated with elevated mortality risk, while exercising frequently appeared protective. No clear association was detected between adulthood religious attendance and mortality in Models 4 or 5, a pattern inconsistent with numerous earlier studies (e.g., Hummer et al. 2010; Musick et al. 2004). However, additional analyses (not shown) considered whether religious attendance predicts mortality when it is the sole indicator of adulthood religiosity in the model. Here, attending religious services once a week was indeed associated with a lower mortality risk (HR = 0.76, $p < .05$), consistent with the findings of previous studies.[5]

Though growing up in a highly religious home unexpectedly predicts elevated mortality risk relative to moderate religious exposure, supplementary analyses (available upon request) indicate that the first chain on the health behavior explanation is well-founded. Relative to those growing up in moderately religious and non-religious homes, people from highly religious backgrounds ended up more likely to regularly attend services in adulthood, less likely to be a current smoker, to have ever done drugs, and less likely to have had drinking affect their work/school.

Transitions in Religious Importance from Childhood to Adulthood and Associations with Mortality

We hypothesized that childhood religiosity could lower mortality risk through the intervening pathway of adulthood religiosity. Results shown in Table 2 from the first phase of our analysis, however, did not support this hypothesis. High levels of childhood religiosity were associated with elevated—not lower—risk of mortality, and the addition of adulthood religious importance failed to elucidate the unexpected association. In addition to exploring adult religiosity as a mediating pathway, we also consider whether childhood religiosity *combines* with adulthood religiosity to predict mortality risk. Religiosity may be a complex cumulative exposure, particularly sensitive to the direction of change between these phases of the life course. For instance, highly religious childhood homes could bear a different association with mortality risk depending on subsequent levels of religiosity. We test this possibility by examining all possible life-course combinations available in our data. This is a

[5] Since the MIDUS data did not contain information about a respondent's childhood religious denomination, additional analyses included a dichotomous measure of belonging to a conservative religious denomination in adulthood (coded using the RELTRAD coding scheme; see Steensland et al. 2000) to test whether those belonging to stricter religious groups at some point in the life course had a different mortality risk. Those reporting belonging to conservative religious traditions in adulthood were not at an elevated mortality risk compared to those belonging to non-conservative religious traditions. Main results were also unchanged with the inclusion of this variable, so it was ultimately excluded from final analyses.

Table 3 Matrix of change in religious importance over the life course

Adulthood religious importance →	Not at all important	Somewhat important	Very important
Childhood religious importance			
Not at all important	300 (45)	193 (36)	106 (16)
Somewhat important	284 (41)	510 (93)	303 (70)
Very important	168 (33)	414 (81)	754 (171)

Number of deaths in each category shown in brackets

conjunction of recalled early religious importance with the measure of adulthood importance, each consisting of three categories for a total of nine combinations. The surprising finding from Table 2 provides a compelling reason to consider such combinations. Table 3 displays a matrix showing the number of deaths by each religious importance transition category from childhood to adulthood.

Adjusting for the full set of covariates used in Table 2,[6] results from Table 4 illustrate that individuals decreasing their religious importance from childhood to adulthood (from "very" to "low" importance) had a marginally significantly higher risk of mortality (HR = 1.56, $p = 0.06$) relative to those who stayed moderately religious. These results are also shown graphically in Fig. 1, which presents hazards of mortality by religious transition group. Those who decline from high to low religiosity (thick black, short-dashed line) clearly have the most pronounced mortality risk. Individuals that reported a decrease from "very" to "somewhat" important (thick black, long-dashed line) also had an increased mortality risk relative to the stable moderates (HR = 1.44, $p < .05$). Taken together, it appears that the "penalty" of being raised in a very religious home is confined to those individuals that become less religious over time.

Results from Table 4 also suggest that relative to those with consistently moderate religiosity in both childhood and adulthood (the reference group; dark gray, long-dashed line in Fig. 1), those who were raised in moderately religious childhood homes but reported high religious importance in adulthood (dark gray, solid line) had a lower risk of mortality (HR = 0.77, $p < .05$). In additional analyses, we also shifted the reference group to individuals reporting low religious importance at both time points (light gray, short-dashed line); those shown in the thick black, solid line (representing individuals with high religious importance both in childhood and in adulthood) also had significantly lower risk than this group (HR = 0.56, $p < .05$). We return in the discussion section to address the implications of these findings and offer interpretations for these patterns of results.

[6] Subsequent analyses considered a progressive modeling strategy, starting with the covariates from Model 3 of Table 2 and then adding in covariates in the same fashion as we did for Model 4 (health) and Model 5 (health behaviors). Results were substantively similar, so we present only the results from the fully adjusted model in Table 3.

Table 4 Transitions in religious importance (childhood → adulthood) and mortality (hazard ratios shown, 95% confidence intervals shown in brackets, $n = 3031$)

Change in religious importance (childhood → adulthood)	Hazard ratio, 95% CI
Not at all, not at all	1.38† (0.95–2.03)
Not at all, somewhat	0.87 (0.51–1.47)
Not at all, very	0.98 (0.55–1.74)
Somewhat, not at all	1.16 (0.74–1.79)
Somewhat, very	0.77* (0.53–1.13)
Very, not at all	1.56† (0.98–2.51)
Very, somewhat	1.44* (1.01–2.06)
Very, very	1.06 (0.73–1.52)

Reference group is somewhat, somewhat. Analyses adjust for all covariates in Model 5 of Table 2

***$p < .001$, **$p < .01$, *$p < .05$, $^{\dagger}p < .10$

Discussion

The main purpose of this study was to determine whether early-life religious exposure was associated with adulthood mortality. Our findings suggest a direct association between the importance of religion in the childhood home and later-life mortality. Yet the direction of the association was contrary to our expectations derived from existing research on religion and health. Adults who reported being raised in a highly religious household were at an elevated risk of mortality relative to those socialized in more moderately religious households. Growing up in a non-religious household posed no detectable mortality risk. Despite considering many intervening variables (e.g., religiosity in adulthood and risky health behaviors), none were able to adequately explain the link between high childhood religiosity and mortality.

A seeming paradox makes our central finding all the more surprising: People raised in highly religious homes were at an increased mortality risk *despite* fitting the profile of overall health and well-being. Indeed, ancillary analyses showed this group to have a lower risk of smoking and heavy drinking, lower depression scores, and lower risk of several major illnesses relative to those raised in moderately or non-religious homes. People raised to be highly religious also visited a doctor with more regularity and reported higher self-confidence and optimism than peers raised in less religious homes.

The surprising mortality penalty associated with high childhood religiosity, however, had an important contingency: It was confined to those who downgraded their religiosity and not observed among those who remained highly religious over time. Growing up in the highest quantile of religiosity necessarily means that one has the farthest possible *range* of religious decline (i.e., a ceiling effect), and prior research documents that any form of drop-off is most common among those raised most devout (Keysar and Kosmin 2008; Silverstein and Bengtson 2018). This pattern was also found in our data. Indeed, for those with highly religious childhoods, 44% reported a decrease in religious importance in adulthood, compared with only 26% of individuals raised in moderately religious homes. Experiencing the downward

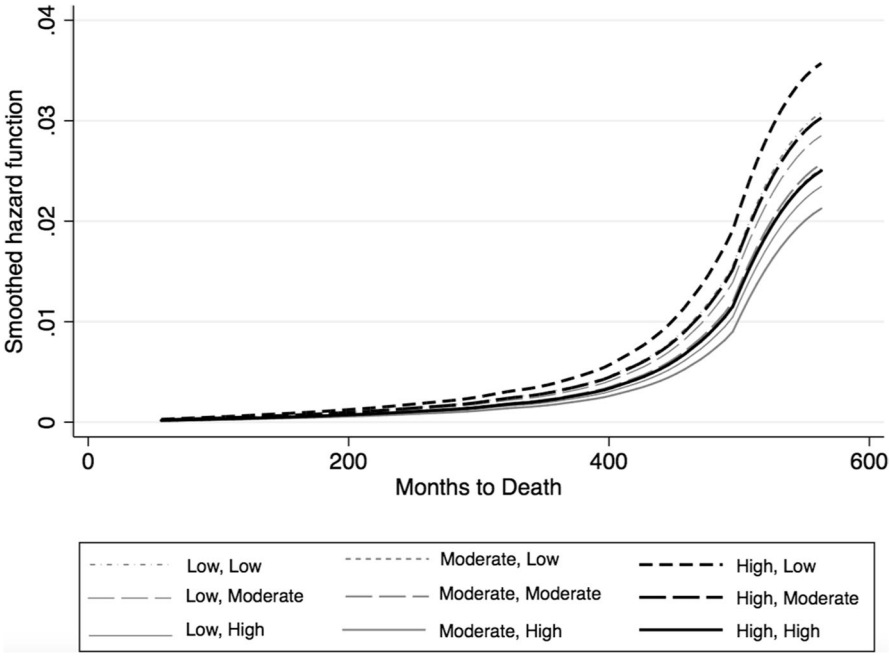

Fig. 1 Hazard ratios, by religious transition, from childhood to adulthood

path from a religious ceiling can carry negative health implications (e.g., Fenelon and Danielsen 2016; Scheitle and Adamczyk 2010). One potential pathway for this process is the social support linked to church attendance and other collective expressions of religiosity (Fenelon and Danielsen 2016; Krause 2006). That is, a decrease in religiosity over time may portend the loss of important social ties that eventually exact a toll on health. Another potential pathway from declining religiosity to health is the loss of a totalizing worldview to make sense of and effectively address life problems (see Park 2005). Losing religion could wipe away some of the cognitive resources that people once depended on for dealing with stress.

Given this speculation about life-course mechanisms, future research should unpack how religious decline from early life to midlife affects individual health profiles, ideally with more frequent measurements of religiosity and health behavioral profiles over time. The covariates we included in this study were not able to explain this overall relationship, which suggests there might be other unmeasured variables that could be incorporated in future work.

Observing transitions in religious importance from childhood to adulthood, however, also revealed that the intensification in religious importance from moderate levels in childhood to high levels in adulthood was protective. Indeed, individuals raised in moderately religious childhood homes who went on to report high religious importance in adulthood reported lower mortality risk relative to those with moderate (and low) religious importance at both time points. The likelihood that an individual raised in a moderately religious home and views religion as "not important"

or as "very important" in adulthood in our sample was roughly equal—26% and 28%, respectively. That this particular transition lowers mortality risk is another important contingency revealed in our data, given that this was not the most common path of religiosity for those raised in moderately religious homes. Though we can only speculate on this point, the choice to embrace and intensify one's religiosity in adulthood may have particularly salient health benefits. At earlier stages of the life course, the decision to be highly religious is often made by parents on behalf of their children (Mahoney 2010); frequently there comes a point when child/adolescent desires begin to diverge from these parental expectations, but in other cases such people may unreflexively persist in their life-course religious trajectory. The group raised in moderation who go on to report higher adulthood religious importance, by contrast, may represent the clearest example of those who fully "own" their religious identity. Further, adults who intensify their religiosity over time often do so to gain meaning in life, to help with personal growth and development, and to have a resource for coping with loss or stress (Silverstein and Bengtson 2018). People undergoing this type of life-course religious trajectory and who purposefully deepen their faith may be indirectly enhancing their health and ultimately lowering their mortality risk.

A major limitation of this study is that childhood religiosity was assessed with a single retrospective measure in the MIDUS survey. Given the complex multi-dimensionality of religion, our analysis would have benefited from other measures of early religiosity. Recollected church attendance, for instance, would help quantify the extent of religious practice in the home. Religious attendance is also broadly thought to be a health-protective resource (the more, the better) in studies assessing how adulthood religious attendance protects against physical health problems and mortality risk (Hummer et al. 1999, 2010; Koenig et al. 2012). It is not clear, however, whether a family's church attendance has identical payoffs to children's health in the near- or long term. Patterns of attendance undoubtedly factor into global assessments of the importance of religiosity in one's childhood home, but the general salience measure likely picks up other dimensions of socialization besides whether or how often the family went to church.

Childhood religious tradition is another dimension of religiosity that our analyses were unable to capture. Supplementary analyses uncovered no difference in mortality risk between those belonging in adulthood to a conservative religious tradition and those of other traditions or of no tradition, but affiliating with Conservative Protestantism during childhood has been linked to decreased wealth accumulation and lowered educational attainment (e.g., Beyerlein 2004; Keister 2008; Uecker and Pearce 2017), circumstances clearly falling on the pathway between early life and adult mortality. Other research suggests that parents belonging to conservative Protestant denominations, on average, apply harsher punishment than those from other religious traditions (Ellison et al. 1996). Authoritarian parenting, in turn, can limit children's autonomy, which has negative implications for future well-being (Baumrind 1991) and mortality (Kern and Friedman 2008). Conservative Protestant parents also tend to hold strong attitudes against deviant behavior, such as pornography use or substance abuse (Ellison et al. 2008; Sherkat and Ellison 1997). Youth raised in this tradition who engage in such behaviors may experience guilt, shame, and strained relationships with their parents (Perry and Snawder 2017), features which could also undermine later health. While the analyses accounted for multiple aspects

of parent–child bonds, including parental affection and maltreatment, there may be specific facets of parenting correlated with religious tradition and that matter for mortality risk which we were unable to include in our models.

Though future research should incorporate multi-dimensional conceptualizations of early-life religiosity, perceived religious importance in the childhood home may be the most telling indicator of the depth of the imprint of religious socialization during childhood. This may be especially relevant for earlier birth cohorts where religious attendance was often a social obligation. Most of the adults in the sample who died between 1995 and 2014 underwent primary socialization in the first half of the twentieth century, a period when the American religious climate was much stronger and an integral part of child socialization (e.g., Edgell 2006). Future research with more recent cohorts is needed to determine whether the results uncovered in our analysis is generalizable or specific to earlier cohorts of the American populace.

Despite its limitations, this study illustrates the need to better understand childhood life religious exposures in a life-course context, particularly with respect to health and mortality. Our findings revealed that the effects of early religiosity are not consistent across categories of childhood religious importance and that moderate levels of childhood religious exposure seem most protective for later mortality, both as a direct association and if accompanied by higher levels of adulthood religiosity. Declines in religious importance over the life course, meanwhile, were associated with increased mortality risk. On the whole, our study suggests that aspects of socialization tied to religious salience in the family home appear to have an association with mortality that is considerably more complicated than the dose–response pattern between adult religious attendance and mortality. Future work should seek to more precisely explicate the intervening mechanisms linking childhood religion with adult health and mortality, especially those involving adult religiosity and health lifestyles throughout the life course.

Acknowledgements This paper was presented at the 2017 Association for the Sociology of Religion Annual Meeting, in Montreal, Canada. We thank William Magee, Andrew Miles, Scott Schieman, Jeremy Uecker, and the anonymous reviewers for their helpful comments on previous versions of this manuscript.

Funding This work is supported by the Canadian Social Sciences and Humanities Research Council (Insight Development Grant #231615) and from the Ontario Ministry of Research and Innovation (Early Researcher Award).

Compliance with Ethical Standard

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval Ethical approval was not required for this paper. The data we used are publically available through the Inter-university Consortium for Political and Social Research (ICPSR Web site, https://www.icpsr.umich.edu/icpsrweb/ICPSR/series/203).

Appendix

See Table 5.

Table 5 Summary of missing data

Variable	Number of missing cases	Percent of missing cases (%)
Mortality	1	< 1
Religious importance in childhood home	19	< 1
Age	0	0
Gender	0	0
Race	67	2
Parental education	0	0
Parental divorce	3	< 1
Parental affection	0	0
Parents on welfare	20	< 1
Emotional abuse	31	1
Physical abuse	23	< 1
Urban childhood residence	201	7
Marital status	0	0
Respondent education	2	< 1
Household income adulthood	106	3
Religious attendance (adult)	65	2
Religious importance (adult)	77	3
Cancer	5	< 1
High blood pressure	20	< 1
Heart problems	8	< 1
Lung problems	15	< 1
Diabetes	16	< 1
Stroke	18	< 1
Physical health	2	< 1
Mental health	5	< 1
BMI	0	< 1
Ever used drugs	17	< 1
Drinking affects work/school	0	< 1
Former smoker	0	< 1
Current smoker	1	< 1
Exercise frequency	7	< 1
Visited a doctor	85	3

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