



Characteristics of Danish Centenarians' Religious Beliefs: A Nationwide Population-Based Study

Tobias Opsahl¹ · Alex Kappel Kørup¹ · Karen Andersen-Ranberg^{2,4} · Kaare Christensen^{2,3} · Niels Christian Hvidt¹

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Abstract

Research has shown that in groups of increasing age, religiousness becomes more prevalent. However, centenarians have only to a very limited extent been included in studies. The aim of this study is to characterize religious beliefs and practices in a larger sample of centenarians than have before been included in research on the matter. Using the Danish Civil Registration System, all individuals turning 100 in 2015 in Denmark were invited to participate ($N=498$); 364 participated (73%) (82% women). Descriptive statistics on the centenarians' self-reported belief, frequency of prayer and attendance at service were compared to the Danish general population. Associations between religious measures and age were examined using multivariable logistic regressions, controlling for sex and region. Centenarians more often reported being believers, praying and attending religious service, compared to all other age groups. Age, gender and region were all significant predictors of religiousness. The results of this study add to the body of the literature on religiousness and ageing, but extend it by including older age groups than have before been investigated. These findings warrant further investigations into the role of belief in this group and how it relates to mental health.

Keywords Religious coping · European values study · Oldest old · Religious practice · Transcendence

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✉ Tobias Opsahl
topsahl@health.sdu.dk

Extended author information available on the last page of the article

Introduction

During the twentieth century, life expectancy has increased by at least 30 years in Western Europe, as well as in the USA, Canada, Australia, New Zealand and Japan, and the pace of the increase in longevity is not expected to decelerate anytime soon (Christensen et al. 2009; Statistics-Denmark 2018). This means that more people reach advanced age than ever before. In fact, in most developed countries, the estimated number of centenarians has more than doubled each decade since 1950 (Why Population Aging Matters—A Global Perspective 2007). Centenarians thus represent an age group whose robust emergence is new, and accordingly, research into this group has only been a phenomenon of the past few decades (Willcox et al. 2010).

With the emergence of new age groups, new life stages which may be characterized by unique attributes may appear. While several studies have investigated medical and psychological attributes of being a centenarian (for a summary of articles on the Danish Centenarian cohorts, see Rasmussen et al. 2017), only few studies have investigated the characteristics of religious beliefs and practices in this group. From a health care perspective, research into this phenomenon is important since religious beliefs and practices may play a central role as a source of meaning and transcendence (Baumeister 1991) which may, in turn, provide the individual with means to cope with adversities such as disease, disability and personal loss (Carr et al. 2015). Even though centenarians are extreme survivors, diseases such as cardiovascular diseases, cancer, diabetes and chronic lung diseases are quite common (Rasmussen and Andersen-Ranberg 2015). In addition, the majority would be expected to have lost their spouses, most of their friends and some even their children. Coping with such existential adversities may require existential means, and therefore, exploring religious beliefs and practices may be especially pertinent in this age group. Knowledge about centenarians' religious beliefs and practices may provide health care professionals with important points of departure in the support and care for this group of individuals.

The aim of the current study was hence to characterize religious beliefs and practices in Danish centenarians. To do so, we compared the characteristics of Danish centenarians to a Danish control sample based on the European Values Study (EVS).

Background and Objectives

A common notion is that, as people age, they become more attentive to religious matters in their lives. Accordingly, centenarians would be expected to experience and practice their religiousness to greater extent, compared to younger age groups; however, research on the matter is equivocal. With regard to attendance at service, the majority of studies point to an increase with successively older age groups followed by a decline in the oldest old (Bengtson et al. 2015; Hayward

and Krause 2013, 2015; Markides et al. 1987), although some studies point to no such differences between age groups (cf. Crockett and Voas 2006; Idler et al. 2009). The literature on prayer and self-reported belief is more ambiguous. Some studies suggest that both prayer and self-reported belief reach their maxima in the oldest old (Bengtson et al. 2015; Hayward and Krause 2013; Levin and Taylor 1997; Schwadel 2010), while others do not find them to differ systematically between age groups (Crockett and Voas 2006; Idler et al. 2009; Markides et al. 1987). It is important to consider, however, that not only age itself but also birth cohort and period of data collection may influence the associations between age and religiousness observed (Bengtson et al. 2015; Hayward and Krause 2015; Schwadel 2010).

While centenarians were often included in the samples (see Crockett and Voas 2006; Hayward and Krause 2015; Levin and Taylor 1997; Schwadel 2010), they were not an object of particular attention, and generally small numbers were included. Therefore, in this meagre data material, characterizing religious beliefs and practices in centenarians has not been feasible. Few other studies have sought to characterize religiousness specifically in centenarians, but this body of literature presents as diverse in terms of methodology, focus and geographic setting. In a qualitative study from Barbados, Archer et al. (2005) found religiousness to be an overriding theme in their interviews in a sample of 25 centenarians, when exploring subjectively experienced factors associated with life satisfaction, well-being and longevity. Supporting these findings, in a qualitative study from Ohio exploring how spirituality was important in the lives of 16 centenarians, participants emphasized divine support in their lives as well as their belief in a Christian God (Manning et al. 2012). Three studies investigated the issue employing a quantitative design. In a study conducted in Italy, Buono et al. (1998) found in a sample of 38 elderly subjects that the group of near-centenarians (86–99) attached greater importance to religious faith than the relatively younger group, aged 75–85, did. In contrast, Courtenay et al. (1992), studying 165 individuals aged 60–100+ from the state of Georgia in the USA, found no significant differences between centenarians, octogenarians and sexagenarians in terms of religiousness measured on five dimensions (ideological, intellectual, ritual, experiential, consequential). Still, religiousness was high in all groups. These findings were supported by another study of 221 elderly Norwegian subjects between the ages of 80 and 105 (Bondevik and Skogstad 2000). Asking if the respondents would say that religion meant anything to them, no association with age was identified; however, as was the case in the study by Courtenay et al. (1992), religiousness was generally high in their sample.

In summary, these studies concordantly pointed to religious beliefs being of importance to centenarians and thus being quite characteristic of this group, even though some studies found that they were not necessarily more intense compared to relatively younger old individuals' religious beliefs (cf. Bondevik and Skogstad 2000; Buono et al. 1998). This summary, however, should be understood in the context of some important issues. Firstly, only two of the studies compared centenarians to younger age groups, (Bondevik and Skogstad 2000; Buono et al. 1998), but these did not include comparisons younger than 75. Including even younger age groups for comparison could yield important insights into the specifics of the characteristics

of religious beliefs and practices in centenarians. Secondly, none of the studies of centenarians employed similar conceptualizations of religiousness, thereby hindering comparisons of results. Thirdly, none of the studies reported selecting a representative sample of centenarians for a given nation, thereby potentially reducing generalizability.

With the present study, we set out to fill the knowledge gaps by investigating quantitatively the religious profiles of a population-based nationwide sample of Danish centenarians, employing widely used operationalizations of religiousness, i.e. self-reported belief, prayer and attendance at service in a larger sample of centenarians than has been investigated before.

Methods

Design

We compared data from 287 Danish centenarians (i.e. individuals aged 100 years), collected in 2015, with a random sample of 1507 Danes from the EVS, collected in 2008. EVS was chosen as comparison because of similar wording of questions.

The Centenarians

The data on centenarians utilized in the present study were collected as part of a series of studies on consecutive cohorts of centenarians in Denmark (see Rasmussen et al. 2017, for an overview). Using the Danish Civil Registration System (CRS) (Pedersen 2011), all Danes turning 100 years in 2015 and were invited to participate in the study, and no exclusion criteria were employed. Out of 498 eligible centenarians, 364 (73%) participated; of these, 287 (79%, 58% of the total sample) participated personally, while the remaining 77 (21%) had proxies responding for them. The sample was split in two, based on whether the participants lived in eastern or western parts of Denmark (i.e. east and west of The Great Belt). In east, participants were interviewed by trained lay interviewers from the National Centre for Social Science Research, whereas a geriatrician and a nurse conducted the interviews in west. Of the entire sample, 102 (36%) were from the eastern part of Denmark (Table 1).

Due to the subjective nature of certain aspects of religiousness, proxies were only asked about attending religious service. Therefore, for the sake of simplicity, all proxy responses were dropped. Participants were assessed in their homes, including nursing homes.

EVS

EVS is a large, cross-national and longitudinal research programme on basic human values. The first survey was performed in 1981, and every 9 years, a new one is conducted. To date, four waves have thus been completed and published. In the present study, data from the 4th wave of EVS, collected in 2008, were employed (EVS 2008

Table 1 Descriptive statistics on distribution of age, gender and region over age groups

	EVS				Centenarian 1915 birth cohort 100 (N=287)
	18–25 (N=131)	26–45 (N=515)	46–65 (N=560)	66–75 (N=202)	
Age, mean (SD)	21.77 (2.05)	36.81 (5.77)	55.51 (5.78)	69.71 (2.77)	81.41 (4.40)
Gender: female (%)	65 (50)	260 (50)	287 (51)	104 (51)	44 (44)
Region: east (%)	46 (36)	196 (39)	204 (37)	81 (41)	30 (31)

The age groups of 18–25, 26–45, 46–65, 66–75 and 76–95 are from the EVS and the age group of 100 from the study of centenarians. In the study of centenarians, age was not specified more precisely; therefore, no mean age is reported

Method Report 2010). In total, about 70,000 people have been interviewed from 47 European countries. To target the aim of the present study, only data on the Danish respondents were included.

Initially, 2950 people were drawn as a simple random sample of the adult population over 18 years of age from the CRS. Of these, 1507 participated (51%). Interviews, consisting of 250 questions, were conducted by trained lay interviewers from the National Centre for Social Science Research. For more information about the methodology and design of the Danish contribution to the EVS, see EVS 2008 Method Report (2010).

Measures

We employed three different operationalizations of religiousness, measuring both private and organizational forms (Hall et al. 2008). Due to slight variations in the phrasing of the questions and the options offered in the EVS and the present study, options were collapsed in order to make them comparable across the studies. A thorough description of this process, as well as more details on the phrasing and answer options of the items included, is given in Supplementary Table 1.

Attendance at religious services was measured by asking participants the frequency of their attendance at religious services. In the study of the centenarians, the item on attendance not only asked about the frequency of attendance, but also the frequency of listening to radio broadcasts of religious services. This option was added to capture organizational forms of religiousness in centenarians who may very well be so frail that going to service may not be an option.

Prayer was measured by asking respondents the frequency with which they prayed.

With regard to measuring self-reported belief, in both EVS and the study of centenarians, participants were asked whether they considered themselves to be a believer or not. In EVS, respondents had the additional option of reporting being a convinced atheist. For comparison, atheists and non-believers were collapsed, making one category of non-believers.

While religious denomination is often included in studies on religiousness, in the present paper it was not, since it was not reported for the centenarians and because 98% of the sample from the EVS were protestants. Therefore, participants of other denominations were too few to include denomination meaningfully in the analyses.

Analysis

Participants from the EVS were stratified into three age groups (18–25, 26–65, 66–75, 76–95). This division is based on the literature pointing to important differences between these groups. For example, with regards to religious attendance, Hayward and Krause (2013) found a decline between the ages of 15 and 25, at which point it found a stable level. Also, around age 65, an increase was seen followed by a decline around age 75. After inspection of the present data, the group 26–65 was

divided into two groups, making the groups as follows: 18–25, 26–45, 46–65, 66–75 and 76–95. These groups were compared with the group of centenarians.

Bar graphs and statistics were produced using Stata version 15.

To control for the effects of gender and geographic region, i.e. east or west of the Great Belt, on the association between age (for this purpose included as a continuous variable) and measures of religiousness, ordered logistic regressions assuming proportional odds were fitted for prayer and attendance at service. Self-reported belief was a binary outcome; therefore, a binary logistic regression model was fitted. In addition, univariable regressions were conducted to compare the predictive ability of gender on religiousness across age groups.

The threshold of statistical significance was set at $p < .05$.

In figures, missing observations and responses of ‘do not know’ were excluded. Due to data regulations, no cells in tables can count less than three. Therefore, missing observations and responses of ‘do not know’ were collapsed in the tables.

Results

Self-reported Belief

The overall association between reporting being a believer and age was positive, being lowest in the group of 18–25-year-olds (52%) and reaching a maximum in the group 76–95-year-olds (87%), with slightly fewer centenarians reporting being believers (81%) (Table 2, Fig. 1). Accordingly, in the group of 18–25-year-olds, individuals reporting being non-believers reached its maximum (48%). Reporting being a non-believer decreased with successively older age groups and reached its minimum in the 76–95-year-olds (13%).

Prayer

Prayer showed an overall increase with successively older age groups, reaching from 10% reporting praying at least once a week in the group of 18–25-year-olds to 56% in the group of centenarians, with a difference of 29 percentage points between the 76–95-year-olds and the centenarians (Table 2, Fig. 2). Approx. half of the respondents in the groups of 18–25-, 26–45- and 46–65-year-olds reported never praying (53%, 51% and 51%, respectively), with 31% reporting never praying in the group of centenarians.

Attendance at Service

Percentages of respondents reporting attending service at least once a month showed an overall increase with age, reaching its maximum in the centenarians (45%), with a difference of 27 percentage points compared to the group of 76–95-year-olds (Table 2, Fig. 3). The percentages of individuals responding attending service on specific holidays, once a year or less than once a year were highest in the group of

Table 2 Distribution of responses on self-reported belief, prayer and attendance at service in the 18–25- to 76–95-year-olds from the 8th wave of EVS and in the centenarians from a separate study

EVS	Centenarians					
	18–25 (N = 131)	26–45 (N = 515)	46–65 (N = 560)	66–75 (N = 202)	76–95 (N = 99)	100 (N = 287)
Self-reported belief (%)						
Believer	64 (52)	346 (69)	411 (76)	148 (79)	78 (87)	191 (81)
Non-believer	59 (48)	159 (31)	132 (24)	40 (21)	12 (13)	45 (19)
Missing/do not know	8	10	17	14	9	51
Prayer (%)						
At least once a week	13 (10)	58 (11)	92 (16)	62 (32)	26 (27)	133 (56)
Less than once a week	49 (37)	191 (38)	184 (33)	53 (27)	27 (28)	31 (13)
Never	69 (53)	262 (51)	282 (51)	79 (41)	43 (45)	74 (31)
Missing/do not know	–	<5 ^a	<5 ^a	8	<5 ^a	49
Attendance at service (%)						
At least once a month	9 (7)	29 (6)	58 (10)	36 (18)	18 (18)	113 (45)
On specific holidays, once a year or less than once a year	79 (60)	300 (58)	325 (58)	108 (53)	48 (49)	49 (19)
Never, almost never	43 (33)	185 (36)	177 (32)	58 (29)	32 (33)	92 (36)
Missing/do not know	–	<5 ^a	–	–	<5 ^a	33

Percentages were only calculated for observed values and not for missing observations or responses of ‘do not know’

^aWhen < 5 observations for any category, the specific count is not provided due to data regulations

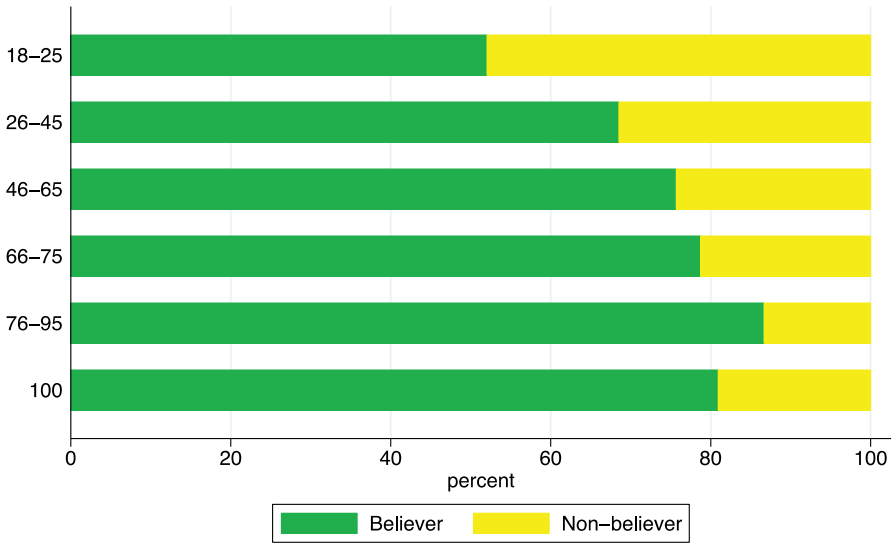


Fig. 1 Distribution of self-reported belief in a sample of Danish respondents. Data on age groups 18–25 to 76–95 are from EVS wave 8, collected in 2008. Data on centenarians were collected as a separate study in 2015

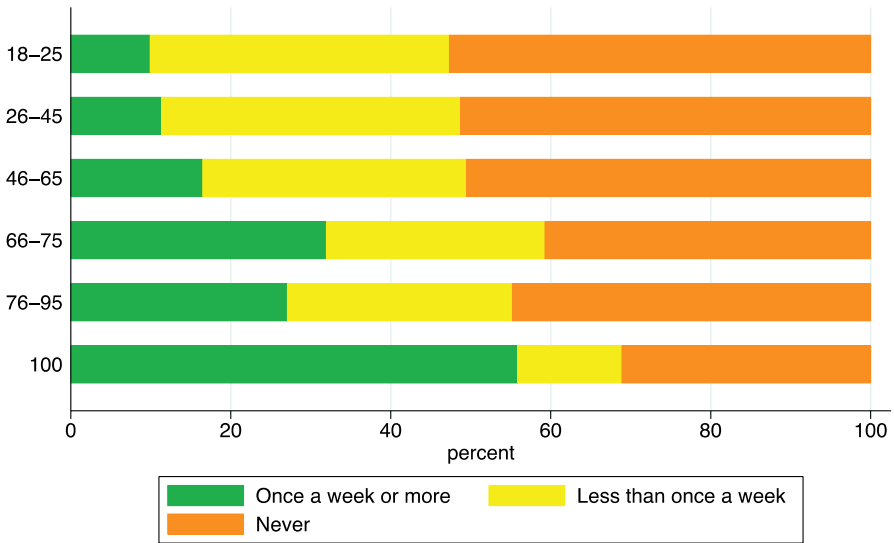


Fig. 2 Distribution of frequency of prayer in a sample of Danish respondents. Data on age groups 18–25 to 76–95 are from EVS wave 8, collected in 2008. Data on centenarians were collected as a separate study in 2015

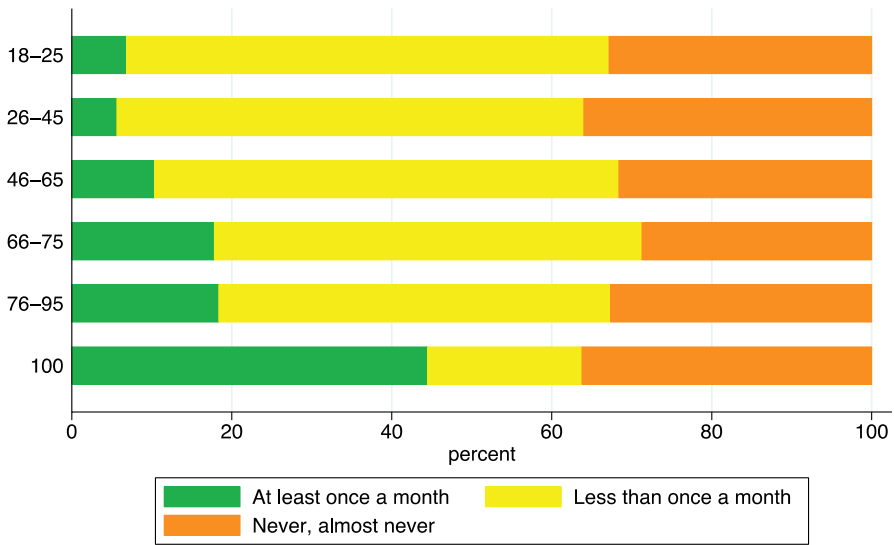


Fig. 3 Distribution of frequency of attendance at service in a sample of Danish respondents. Data on age groups 18–25 to 76–95 are from EVS wave 8, collected in 2008. Data on centenarians were collected as a separate study in 2015

18–25-year-olds (60%) and decreased with successively higher ages, reaching their lowest in the group of centenarians (19%). Between the group of 76–95-year-olds and the centenarians, a difference of 30 percentage points was observed.

Control for Sex and Region

Multivariable binary logistic regressions and ordered logistic regressions were performed to assess the associations of sex, gender and age with the measures of religiousness. Results from the regressions are shown in Supplementary Table 2.

Self-reported Belief

In a multivariable binary logistic regression model, all three predictors were significant. Male gender was associated with lower odds of reporting being a ‘believer’ (OR = .41, 95% CI .32, .51). Living in the eastern part of Denmark was associated with lower odds of reporting being a ‘believer’ (OR = .40, 95% CI .32, .51). Higher age group was associated with higher odds of reporting being a ‘believer’ (OR = 1.02, 95% CI 1.01, 1.02).

Prayer

As regards prayer, gender and age were significant in the multivariable ordered logistic regression model. Male gender was associated with lower odds of praying

(OR = .40, 95% CI .33, .48). Higher age was associated with higher odds of praying (OR = 1.02, 95% CI 1.02, 1.02).

Attendance at Service

In the multivariable ordered logistic regression, all predictors were significant. Male gender was associated with lower odds of attending service (OR = .58, 95% CI .48, .70). Living in the eastern part of Denmark was associated with lower odds of attending service (OR = .72, 95% CI .60, .87). Higher age was associated with higher odds of attending service (OR = 1.01, 95% CI 1.01, 1.02).

Association Between Gender and Measures of Religiousness Across Age Groups

Across age groups, for all religious measures, a decline in effect was observed for the predictive ability of gender on religious measures with increasingly higher age groups (Supplementary Table 3).

Discussion

With the present study, we sought to characterize religious beliefs and practices in centenarians. By doing so, we extended previous research on the association between religious characteristics and ageing by including older age groups than, to our knowledge, have been studied systematically in this regard. Overall, in this cross-sectional study, religious beliefs and practices were generally more prevalent in the sample of centenarians compared to those in the samples of younger age groups collected in the EVS. Thus, these results corroborate the findings of other studies, which show religious beliefs to be of importance to centenarians (Archer et al. 2005; Bondevik and Skogstad 2000; Buono et al. 1998; Courtenay et al. 1992; Manning et al. 2012).

As regards self-reported belief, the overall association with age was positive. These results corroborate the finding that the prevalence of individuals who are affiliated religiously, compared to individuals not affiliated with religion, is higher for successively older age groups, also beyond the age groups which have been previously studied (Bengtson et al. 2015; Hayward and Krause 2013; Schwadel 2010); this inference, however, should be taken with some caution. Both the present study and the EVS employed the term ‘belief’ instead of ‘religiousness’, which may have important influences on the findings. It is common practice in research in a Danish setting to translate ‘religiousness’ with ‘belief’ (Lüchau 2005), since Danes tend to hold an aversion towards the term ‘religiousness’ (Rosen 2009; Salomonsen 1971). While religion could refer to subjective feelings, thoughts and behaviours that arise from a search for the sacred, which is supported by a group formed on the basis of the search itself (Hill et al. 2000), belief could be considered more of an umbrella term, encompassing religion as well as other phenomena, which entail believing that something is true or exists without it being immediately provable (according

to the Oxford Dictionary). Employing the term ‘belief’, therefore, inevitably carries the risk of getting similar answers from people holding different convictions, be it religious, spiritual, etc. Nonetheless, using ‘belief’ safeguards responses from those unwilling to characterize themselves as religious, even though being believers; in addition, those willing to characterize themselves as religious would respond affirmatively to being believers too. Nonetheless, we cannot exclude the possibility that different tendencies would have been observed, had we inquired about religiousness instead, and therefore, comparisons to other studies which employ different terms should be interpreted cautiously.

Related to this, it may be important to note that while we compared different age groups on self-reported belief, belief may entail different notions for different generations. Danes’ beliefs have become increasingly individualized (Lüchau 2005), and therefore, it is important to consider the possibility that there may exist generational differences in addition to individual differences in terms of how ‘belief’ may be defined.

We found that centenarians more often reported praying at least once a week, compared to younger age groups. This finding underscores previous findings that frequency of prayer is higher in older age groups compared to younger age groups (Hayward and Krause 2013; Levin and Taylor 1997). We did not expect, however, to find such a difference in frequency of prayer in older age groups; more than half (56%) of the sample of centenarians reported praying at least once a week, compared to roughly a fourth of 76–95-year-olds (27%). This finding underscores the relevance of investigating characteristics of new age groups that emerge as a consequence of continued increase in longevity since they may be characterized by unique attributes.

With regard to the frequency of attending service, we found this to be higher in centenarians, compared to all other age groups. Thus, these findings are in contrast with the literature which shows attendance to decline in the oldest old (Bengtson et al. 2015; Hayward and Krause 2013, 2015; Markides et al. 1987), and also with the literature which finds no association between age and attendance (Crockett and Voas 2006; Idler et al. 2009). As with prayer, there was a marked difference in frequency attendance between the 76–95-year-olds, of whom 18% reported attending service at least once a month, and the centenarians, of whom 44% reported doing so. Also, these differences should be interpreted with some caution; it is important to emphasize that, in the study of the centenarians, the added option of reporting listening to radio broadcasts of religious services to the response options limits the comparability to the EVS, where attendance was measured as the physical act of attending service (see Supplementary Table 1).

While we set out to investigate differences in religiousness across age groups, other factors may have contributed to the results; indeed, women constituted 82% of the sample of centenarians, compared to $\leq 51\%$ across all age groups from the EVS, and because studies of the Danish population have found women to be more religious than men (Hvidtjørn et al. 2014), this could confound the findings. Therefore, we ran three regression analyses to control the association between age and religiousness for the effects of gender. Since different methods of assessment or interview were used in West and East Denmark and because percentage of individuals

being members of the Evangelical Lutheran Church of Denmark is generally lower in eastern compared to western parts of Denmark (Folkekirkens Medlemstal 2018), region was added as a covariate. Gender, region and age were independently associated with all three measures of religiousness. Therefore, the overrepresentation of women in the sample of centenarians may have contributed to the finding that this group experience greater levels of religiousness, compared to younger age groups. However, in additional analyses, differences in religiousness between genders were increasingly smaller in higher age groups. As regards self-reported belief and attendance at service, the association with gender was non-significant for age group 66–75 and above; for prayer, similar tendencies were observed for age group 76–95 and above. Therefore, while gender may be associated with religiousness in younger age groups, the association disappears in old age. Overrepresentation of women in the sample of centenarians may not pose a problem to the findings.

At least four potential explanations may account for the present findings.

Firstly, one explanation could be that, due to the closeness to death as well as in response to disease and disability, a reliance on religious beliefs for coping develops, thus leading to increased religious beliefs and practices in the group of centenarians (Tornstam 2011). This is supported by studies which find that religious belief tends to increase in intensity in response to significant health challenges (Hvidt et al. 2017; Idler et al. 2009), which centenarians oftentimes face (Rasmussen and Andersen-Ranberg 2015). Secondly, it may well be that age itself entails a maturing or increase in religiousness through psychological processes (Fowler 1986), but also generational differences may be central in explaining the differences in belief found in the present study, due to trends such as secularization and modernization (Lüchau 2005). However, as argued, one explanation does not exclude the other since both generation and age have been found to simultaneously explain differences in religiousness, at least in studies of the US population (Bengtson et al. 2015; Hayward and Krause 2013). Fourthly, individuals may grow old because of their religious beliefs and practices; recent reviews have found that religiousness is associated with lowered mortality in a variety of otherwise healthy populations, among others religious groups such as Baptists and Seventh-Day Adventists (see Oman, 2018, for a review). Although critics have raised methodological and ethical critique of this body of research (Sloan and Bagiella 2002), it is possible that belief contributed to the centenarians' high age through mechanisms such as promoting healthy behaviours, providing opportunities for social engagement and reducing impacts of stressful life events (Zimmer et al. 2016).

Strengths and Limitations

One strength of this study is that it encompasses several aspects of belief—both subjective (i.e. self-reported belief and prayer) and more objective measures (i.e. attendance at service), even though we only asked about quantities and not qualities of religious beliefs and practices; for example, while two individuals may respond that they are believers, they may experience very different forms of belief. Studies already have been conducted on differences in qualities of belief across ages and

cohorts in a Danish setting (Lüchau 2005), but also in this regard, centenarians have not been investigated systematically. Qualitative studies investigating the intentions and ideas associated with both beliefs and practices of beliefs in centenarians could possibly aid in clarifying some of the dynamics observed in the present study.

A limitation is that the data employed were from two distinct studies. While the items compared were very similar across the two studies (see Supplementary Table 1), data from EVS and the centenarian studies were collected in 2008 and 2015, respectively. The difference in time between data collections may mean that the responses are influenced in different ways by period effects and thus that the differences between 18–95- and 100-year-olds are to some extent a question of the period in which the interviews were conducted rather than age itself. However, due to the cross-sectional design of the study, we cannot distinguish between the effects of age, period or cohort. Therefore, it is possible that the characteristics of the centenarians' belief are hallmarks of the period of data collection or of their cohort, rather than of their age; consequently, new generations of centenarians may show different characteristics.

A related limitation is that while centenarians from western parts of Denmark were interviewed by a geriatrician and a nurse, centenarians from eastern parts as well as participants in the EVS were interviewed by trained lay interviewers. It could be speculated whether differences in interviewer professions may have consequences for the trust and confidentiality experienced by the participants, which in turn may affect the responses.

A point of consideration is the participation rate. In the study of centenarians, participation rate was 58% (including proxies: 79%). For comparison, the EVS had a response rate of 51%. In both studies, the main reason for non-participation was not being interested (centenarians, see Rasmussen et al. 2017) and refusal to respond (see EVS (2010)). Whether this non-participation constitutes a bias and thereby reduces the representativeness of the sample in terms of any of the measures included is unknown.

In conclusion, characteristics of religious beliefs and practices in centenarians have only to a very limited extent been investigated in previous research. The present study is the first to investigate the issue with a large population-based nationwide sample of centenarians, employing items similar to those included in studies of the general Danish population which make comparisons possible. The study contributes to the literature by showing that both self-reported belief, prayer and attendance at service are more prevalent and frequent in this group, compared to younger age groups from the Danish general population. Furthermore, especially in terms of frequency of prayer, important differences were identified between the centenarians and younger age groups, leading to considerations about the function of religious beliefs and practices in the centenarians.

These findings carry important implications for further research and practice. Studies should explore the significance of religious beliefs and practices in relation to centenarians' mental and physical health, as well as meaning, quality of life and well-being; although the centenarians report being believers and report higher frequencies of practice than younger age groups do, we do not know whether or in what ways these findings relate to health in the centenarians. Illuminating this

relationship could provide a point of departure or framework for the incorporation of religious belief in the general care and treatment of centenarians.

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Author Contributions TO did the data analysis and wrote the paper. AKK supervised the data analysis and revised the manuscript. KAR, KC and NCH planned the study and revised the manuscript

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Compliance with Ethical Standards

Conflict of interest The authors declare that there is no conflict of interest.

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Affiliations

Tobias Opsahl¹  · Alex Kappel Kørup¹ · Karen Andersen-Ranberg^{2,4} · Kaare Christensen^{2,3} · Niels Christian Hvidt¹

Alex Kappel Kørup
akorup@health.sdu.dk

Karen Andersen-Ranberg
karanberg@health.sdu.dk

Kaare Christensen
kchristensen@health.sdu.dk

Niels Christian Hvidt
nchvidt@health.sdu.dk

- ¹ Research Unit of General Practice, Department of Public Health, University of Southern Denmark, 5000 Odense, Denmark
- ² Unit of Epidemiology, Biostatistics and Biodemography, University of Southern Denmark, J. B. Winsløvs Vej 9B, 5000 Odense, Denmark
- ³ Department of Clinical Biochemistry and Pharmacology and Department of Clinical Genetics, Odense University Hospital, 5000 Odense, Denmark
- ⁴ Department of Geriatrics, Odense University Hospital, 5000 Odense C, Denmark