



Research Paper

Effect of religion on the course of anxiety disorders and symptoms over 9-years follow-up

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ABSTRACT

Background: Religion can be an important aspect in life for people and may therefore be important to consider in anxiety disorders. However, there has been limited research into the longitudinal relationship between religiousness and the prevalence of anxiety disorders or anxiety severity and no such research up to date looking at specific anxiety disorders.

Methods: We made use of data from the Netherlands Study of Depression and Anxiety (NESDA), a large clinical cohort study, including 2981 participants at baseline. Based on religious affiliation, commitment to affiliation and religious attendance at baseline as demographic variables, three groups (non-affiliated; affiliated, low commitment/attendance; affiliated, higher commitment/attendance) were compared regarding the prevalence of specific anxiety disorders and anxiety severity at baseline and at two, four, six, and nine years follow-up. For the analyses, we used graphs and Linear Mixed Models.

Results: Overall, no differences were found for the prevalence of specific anxiety disorders and of comorbidity between anxiety disorders or comorbidity with depressive disorders. Furthermore, results showed no differences between the groups regarding the anxiety severity over time.

Limitations: The main limitations relate to the operationalization of religiousness based on demographic variables at baseline.

Conclusions: On a population level, being religiously affiliated with more or less commitment/attendance does not seem to protect against specific anxiety disorders or more anxiety symptoms, nor is it a risk factor. Further research should focus on more internal religious aspects, and more specifically on anxiety in specific groups of religious people or people with specific religion related anxiety.

1. Introduction

Religion can be an important aspect of life for people and therefore may play a significant role in the onset, maintenance and treatment of psychiatric symptoms (Agorastos et al., 2014; Koenig et al., 2012, 2020; Weisman de Mamani et al., 2010). Koenig et al. (2012) reported in their extensive *Handbook of Religion and Health* that up to then, 299 studies were conducted on the relationship between religion and anxiety. Koenig et al. (2012) state that in 57% of methodologically high-quality studies, religion was associated with lower levels of anxiety symptoms,

while 10% of the studies found religion to be associated with more anxiety symptoms and the other studies reported mixed findings or no association. In a recent edition of their handbook, Koenig et al. (2024) focus more on the effect of religion on (changes in) anxiety over time. They describe eleven prospective cohort studies, of which eight found that religion at baseline predicted less anxiety, two studies found no association and one study found that religion predicted more anxiety. These results seem to support a protective effect of religion on anxiety, however, we must note that there was diversity in samples (e.g., children/adolescents, adults, patients, veterans), in measuring anxiety (such

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as anxiety symptoms, PTSD symptoms or presence of a DSM classification) and in conceptualization of religion (mostly behavioral, such as attendance or coping) making it more difficult to interpret.

So, despite the relatively large number of studies on religion and anxiety so far, most of these studies were cross-sectional, focussed on anxiety in general (i.e. level of symptoms) and often included a more demographic or behavioural measure of religion. And in the prospective studies, the longitudinal character was mostly restricted to one or two follow-up measurements. Relatively few research has focused on the (longitudinal) associations between (aspects of) religion and the course of specific anxiety disorders. These focuses are important, because treatment 1) happens over time and 2) is often targeted at the characteristics of specific anxiety disorders.

The few studies that focused on these associations reveal ambiguous results as well. For example, Brito et al. (2021) found a positive association between being a religious believer and generalized anxiety disorder, but a negative association between being a religious observant and social anxiety. There was no association found with panic disorder. In another study King et al. (2013) reported no difference in the prevalence of anxiety disorders (e.g., panic disorder, phobias, generalized anxiety disorder and obsessive-compulsive disorder) between religious and non-religious people in a British population. They measured religion using six questions from the Royal Free interview for religious and spiritual beliefs (King et al., 2001). Baetz et al. (2006) on the other hand, measured religion with religious attendance and the use of spiritual values. They observed that religious attendance was associated with lower odds of panic disorder and social phobia, while the strength of spiritual values was associated with higher odds of social phobia and panic disorder. These studies however, were cross-sectional in design. With regard to longitudinal associations, Wang et al. (2015), for example, found that in primarily a Muslim sample, religion (as measured by religious affiliation) was associated with a higher prevalence of anxiety disorders. On the contrary, in a large-scale American epidemiological study, Rasic et al. (2011) showed that both religious attendance and seeking spiritual comfort as aspects of religion were not related to a higher or lower presence of any anxiety disorder.

Although this overview may not be exhaustive, it shows that a limitation of research so far is a lack of a longitudinal focus on the association between religion and the course of specific anxiety disorders. And especially in people suffering from an anxiety disorder as a more clinical population. Therefore, we aimed to fill this gap by using data from a large, longitudinal clinical population sample on the presentation and course of anxiety and depressive disorders: the Netherlands Study of Depression and Anxiety (NESDA; Penninx et al., 2008). Within this study, religion was included with three questions at baseline. First, participants were asked if they were religiously affiliated or not. Second, when affiliated, participants were asked about their commitment towards their affiliation and about their religious attendance. Our first aim was to examine whether three different groups based on these questions (not affiliated vs. no to little commitment/attendance vs. higher commitment/attendance) differed over time regarding the prevalence of specific anxiety disorders and any anxiety disorder with and without comorbid depressive disorders. Next to this, we aimed to examine differences between these groups of the level of severity of anxiety symptoms over time for each of these categories of anxiety disorder.

Religiousness - the level to which certain religious beliefs, practices or rituals related to the 'transcendent' are important to someone - is a broad concept, that may be further operationalized in different ways (Koenig et al., 2012; 2020). For example, through (aspects of) believing, bonding, behaving and belonging (Saroglou, 2011). The different operationalisations (or specific focus on aspects) of religiousness could explain the mixed findings in the longitudinal associations and relationship between religiousness and specific anxiety disorders. In an overview article, Rosmarin & Leidl (2020) state that cognitive/emotional aspects of religion, represented in believing and bonding, are inversely related to anxiety (e.g., positive beliefs, motivations, emotions

or attachment are related to lower levels of anxiety), while the behavioural aspects of religion, functioning as coping mechanisms, may reduce anxiety symptoms (Pargament, 1997; Rosmarin 2018; Zwingmann et al., 2008), but also may lead to increased anxiety symptoms (for example when they evoke guilt (Peterman et al., 2014) and/or shame (Exline et al., 2000)). These two directions can level each other out, which results in no associations or small effects in either direction.

As the questions about religion in this clinical population-based study are of demographic nature and fore mostly may be seen as reflecting a combination of religious belonging (affiliation/commitment) and behaving (commitment/attendance), we expect to find results comparable to the distinction outlined by Rosmarin and Leidl (2020). That is that in this study, the three groups based on religiousness will be comparable regarding prevalence of specific anxiety disorders and severity of anxiety over time.

2. Method

2.1. Design and participants

Participants were part of NESDA, a large longitudinal study ($N = 2981$ at baseline) on the course and consequences of anxiety and depressive disorders in a representative sample "stratified for setting (community, primary care and specialized health care)" (Penninx et al., 2008). This group included controls without anxiety of depressive episodes as well as people with a first or recurrent anxiety or depressive episode and people with a previous episode or current subthreshold level of anxiety or depressive problems. In this sense, it was not aimed to be a representative general national sample. In the NESDA study, up to date six follow-up waves have been conducted (the sixth data collection point is thirteen years after baseline). In the present study, the data of the participants from the baseline wave and the follow-up waves of two years, four years, six years and nine years were included. The NESDA protocol was approved by the Ethical review board of the VU University Medical centre (reference number 2003/183) and by the local ethical review boards of the participating mental health care centres. Participants were only included after informed consent was provided. Further information about the design, procedure and participants of the study can be found in Penninx et al. (2008).

2.2. Measures

2.2.1. Religiousness

In the NESDA study, religiousness was measured only at baseline. Participants were asked the following question: 'Do you have a religious affiliation?' When affiliated, they answered two more items about attendance 'Do you ever go to church or another place for prayer?' (never, one time a year or less, a few times a year, every month, two or three times a month, every week or more often) and 'commitment to one's religious affiliation' (no commitment, a little commitment, commitment, strong commitment). For the purposes of this study, and because of the relative high correlation between commitment and attendance (Spearman's $\rho = 0.67$; $N = 1084$), we made the following distinctive groups to operationalize religiousness: 1) people with no religious affiliation (*non-affiliated*; $N = 1897$), 2) religious affiliated people with no commitment or a little commitment and low religious attendance (a few times a year or less) (*affiliated low commitment/attendance*; $N = 619$) and 3) religious affiliated people who are committed or strongly committed and/or have high religious attendance (once a month or more) (*affiliated higher commitment/attendance*; $N = 465$). The last group thus also included 30 (6.5%) people with no to low commitment, but high religious attendance and 188 (40.4%) people with (strong) commitment, but low religious attendance. The remaining 247 (53.1%) scored high on both commitment and attendance within our operationalisation.

2.2.2. Presence of anxiety disorder

The Composite International Diagnostic Interview (CIDI) (WHO, 1997) was used to assess the presence of anxiety disorders according to the criteria of the fourth edition of the Diagnostic and Statistical Manual of Mental disorders (DSM-IV) (American Psychiatric Association, 1994). The CIDI can be regarded as a reliable instrument to assess psychiatric diagnoses (Wittchen, 1994). For the purpose of this study, we examined the presence/absence in the last month of 1) specific anxiety disorders (i. e., agoraphobia, social phobia, generalized anxiety disorder and panic disorder with or without agoraphobia), 2) comorbid anxiety disorders and 3) any anxiety disorder with or without a comorbid depressive disorder (major depression or dysthymia). These comorbidities, two classifications of anxiety disorders and a classification of both an anxiety disorder as well as an depressive disorder at the same time were included, because they are clinically relevant for the course of treatment and the severity of the symptoms experienced. (Klein Hofmeijer-Sevink et al., 2012). In the NESDA study only agoraphobia, social phobia, generalized anxiety disorder and panic disorder with or without agoraphobia were assessed. Therefore, these anxiety disorders were included in the current study and not, for example, specific phobia's or the post-traumatic stress disorder. We choose present/absent in the last month, as this was the closest to the actual moment of measurement and thereby possibly has led to the most accurate anxiety severity score for our second aim.

2.2.3. Anxiety and depressive symptoms

The severity of anxiety symptoms was assessed by means of the Beck Anxiety inventory (BAI; Beck et al., 1988), a widely used self-report questionnaire. The BAI consists of 21 items, which are scored on a four-point scale. In this study, the total score (range 0–63) was used whereby a score of 0–7 indicates minimal anxiety, 8–15 mild anxiety, 16–25 moderate anxiety and 26–63 severe anxiety. The BAI shows high internal consistency, good test-retest reliability and good validity (Beck et al., 1988; Fydrich et al., 1992).

The Inventory of Depressive Symptoms-Self Report (IDS-SR) was included to measure self-reported depressive symptoms (Rush et al., 1996). It consists of 30 items that are scored on a four-point scale. The IDS-SR has high internal consistency and good concurrent validity (Rush et al., 1996; Trivedi et al., 2004). We used the total score (range 0–90), whereby a score of 0–13 indicates no depression, 14–21 possible or mild depression, 22–30 moderate depression, 31–38 severe depression and 39–90 very severe depression (Rush et al., 2000). The IDS-SR was included in this study because comorbidity with depression may impact the course of anxiety disorders (Ter Meulen et al., 2021).

2.3. Data analysis

First, descriptive analyses on age, sex assigned at birth, type of religious affiliation, anxiety and depressive symptoms and prevalence of depressive disorders at baseline were presented. Differences between groups were analysed using chi-square tests and one-way ANOVA tests. For the first aim, the prevalence of each category of anxiety disorders at baseline, after two years, four years, six years and after nine years in the different groups was examined with chi-square tests. In case of an overall significant chi-square test, Fisher's exact tests were used to analyze differences between specific groups.

For the second aim, only participants who had an anxiety disorder at baseline were selected. Using Linear Mixed Models (LMM), we examined for each anxiety disorder category, whether the three groups based on religiousness differed with regard to the course of the severity of anxiety symptoms after two years, four years, six years, and after nine years (BAI-score). Age and sex assigned at birth were used as covariates in a first model. In addition, in a second model the level of depressive symptoms after two, four, six, and nine years was used as a covariate (IDS-score). Mixed models are in general robust for handling missing values. For all groups of anxiety disorders, the LMM (with Maximum

Likelihood estimation) included a random intercept and random slope for time on subject level to control for repeated measures within people, based on –2 restricted log likelihood comparison in the first models. We present the regression coefficients as the overall differences in anxiety symptoms over time for the comparison of the *non-affiliated-group* versus the *affiliated low commitment/attendance-group (LCA)* and versus the *affiliated higher commitment/attendance-group (HCA)*.

For both aims, a Bonferroni correction was used for the p-value to control for the multiple comparisons. (i.e., for the results of table 2 $\alpha = 0.05/7$ and for the results of table 3 $\alpha = 0.05/6$). All analyses were performed with SPSS version 26.0. Agoraphobia as a specific anxiety disorder was excluded in the LMM analysis because the number of people ($N = 88$) was too low.

3. Results

3.1. Characteristics of the sample

Table 1 presents the characteristics of the total NESDA-sample at baseline ($N = 2981$), divided over the three groups based on religiousness. The participants were not equally divided over the three groups, with the non-affiliated group being three to four times the size of the other two groups. The groups did not significantly differ when it comes to sex assigned at birth, anxiety or depressive symptoms at baseline and the prevalence of major depressive disorder/dysthymia. Although statistically significant, the absolute age difference between the groups was

Table 1
Background and clinical characteristics of the sample, divided over the three groups based on religiousness.

	Non-affiliated ($N = 1897$)	Affiliated low commitment/ attendance ($N = 619$)	Affiliated higher commitment/ attendance ($N = 465$)	p-value
Background characteristics				
Age (M, SD)	41.0 (12.8)	43.5 (12.8)	43.1 (14.1)	<0.001
Sex assigned at birth (% female)	65.7%	65.6%	70.3%	.15
Religious affiliation distribution				
% Dutch Reformed	-	35.9	35.1	<0.001
% Roman Catholic	-	51.1	32.3	
% Christian Other	-	6.1	17.2	
% Islam	-	2.4	7.5	
% Eastern religion	-	0.8	3.7	
% Other	-	3.7	4.3	
Clinical characteristics				
Prevalence of any anxiety disorder (% positive)	36.7%	38.1%	36.1%	.77
Prevalence major depressive disorder/dysthymia (% positive)	27.4%	29.7%	32.0%	.11
Anxiety symptoms at baseline (M, SD)	12.1 (10.7)	12.0 (10.4)	12.2 (11.0)	.92
Depressive symptoms at baseline (M, SD)	21.4 (14.0)	21.5 (14.2)	21.8 (14.4)	.90

relatively small. There was also a significantly different distribution of religious affiliation between the affiliated low commitment/attendance group and the affiliated higher commitment/attendance group, whereby the latter had a higher prevalence of all religious affiliations except for Dutch Reformed affiliation and Roman Catholic.

In Table 2, we elaborate on the clinical characteristics of the total sample, by presenting the severity of the anxiety and depressive problems per group of people with or without a (specific) anxiety disorder at baseline. As can be seen, there are differences between the specific anxiety disorders on both anxiety and depressive severity scores. Furthermore, a classification of anxiety with comorbid depressive problems or two or more anxiety disorders is related to more reported anxiety and depressive symptoms.

3.2. Prevalence of anxiety disorders

The bar charts in Fig. 1 and 2 show the prevalence of all (groups of) anxiety disorders at baseline and at follow-up. Overall, the prevalence at baseline was higher than at follow up and there may be decrease visible over time, except for agoraphobia. However, for all different moments of measurement the percentages seem to be comparable across the three groups. Based on the chi-square tests, no initial statistically significant ($p < .05/7$) differences in the percentage of all groups of anxiety disorders were found between the three groups at all moments of measurement (only for panic disorder at six years follow-up we found a statistically significant difference before correction for multiple testing).

Post hoc, we checked whether results were different when the presence/absence of anxiety was not within in the last month, but could be at any moment between two waves. Although the percentages across the three different groups were somewhat different, because of the extension of the chosen period, we did not find more significant differences after correction. Next to this, we also checked whether the results were different when the group was divided according to sex assigned at birth. In these analyses also no significant differences were found after correction.

3.3. Course of severity of anxiety symptoms in participants with an anxiety disorder

At baseline the mean total score on the BAI for the total group with any anxiety disorder ($N = 1101$) was 19.5 ($SD=10.9$), whereas for the three groups these scores were not significantly different ($p=.58$): (1) non-affiliated = 19.7 ($SD=11.0$), (2) affiliated low commitment/attendance = 18.8 ($SD=10.7$) and (3) affiliated higher commitment/

Table 2

Level of anxiety and depressive symptoms, divided over the groups of people with or without a (specific) anxiety disorder at baseline.

	Level of anxiety symptoms at baseline (M, SD)	Level of depressive symptoms at baseline (M, SD)
No anxiety disorder ($N = 1880$)	7.8 (7.7)	16.1 (12.0)
Generalized anxiety disorder ($N = 156$)	17.0 (8.3)	32.1 (10.2)
Panic disorder ($N = 229$)	18.9 (11.0)	25.6 (11.9)
Social phobia ($N = 220$)	15.5 (9.3)	27.1 (11.1)
Agoraphobia ($N = 88$)	11.8 (9.8)	24.1 (11.9)
Any anxiety disorder without comorbid depressive disorder ($N = 559$)	16.1 (9.8)	23.9 (10.1)
Any anxiety disorder with comorbid depressive disorder ($N = 542$)	23.0 (11.0)	37.9 (11.0)
Comorbid anxiety disorders ($N = 408$)	24.1 (11.1)	36.4 (12.5)

Note. Range of anxiety symptoms (BAI) = 0–63, while range of depressive symptoms (IDS) = 0–90.

attendance = 19.8 ($SD = 11.1$). In Table 3 the course of the severity of anxiety symptoms in this group is shown. For all subgroups of anxiety disorders and in both the model without/with depressive symptoms as covariate, the three groups based on religious affiliation, commitment and attendance did not differ with regard to the anxiety symptoms over time. Adding the IDS total score as covariate did improve the model (e.g., smaller 95% CIs), however, given the possible range of the BAI the effect estimates for group comparisons were small. We must note that these estimates represent the average difference between groups over all moments of measurement (baseline until 9-year follow up). For these analyses we again checked post hoc whether the results were different when the group was divided according to sex assigned at birth (leaving sex assigned at birth out as a covariate in the LMM) and found no significant differences between the three groups.

4. Discussion

The aim of the current study was to examine whether three groups based on religiousness (non-affiliated, affiliated low commitment/attendance, affiliated higher commitment/attendance) differed in the prevalence of specific anxiety disorders and anxiety severity over time. With regard to groups of (specific) anxiety disorders - social phobia, panic disorder, agoraphobia, generalized anxiety disorder, comorbid anxiety disorders and any anxiety with/without comorbid depressive disorder - the three groups based on religiousness in general showed no differences in prevalence at baseline and at two-, four-, six- and nine years follow up. Next to this, the three groups were not different regarding the course of the severity of anxiety symptoms in people with an anxiety disorder at baseline or over time for any of the specific anxiety disorders. Moreover, the effect estimates were relatively small, considering the possible range of the BAI total-score.

The comparability between the groups in this study, in combination with the mixed findings of previous research (Beatz et al., 2006; Brito et al., 2021; King et al., 2013; Rasic et al., 2011; Wang et al., 2015), may indicate that on population level being religious affiliated (with more or less religious attendance and commitment to this affiliation) is neither a protective nor a risk factor in the course of anxiety disorders. Although these studies, including the current one, used different operationalisations of religiousness, they were mainly demographical and/or aspects of the belonging (e.g., religiously affiliated) and behaving (e.g., attendance) dimension of religion. Therefore, the results of this study seem to be in line with the notion provided by Rosmarin and Leidl (2020) that religion is a multifaceted construct of which the more behavioural measures of religion may be related to both higher levels of anxiety and less anxiety. On individual level this may for example mean that for some people religious behavior (e.g., praying, attending services) may have an anxiolytic effect, while for others it may nurture worry and thereby in turn nourish even more anxiety. On average in our population, these effects may have leveled out and led to a comparable prevalence and course of anxiety severity over time in the three groups.

4.1. Implications for research and practice

Based on the discussion above, we propose that further research on religion and anxiety should focus more on specific characteristics of a subgroup of religious people and less on epidemiological population-based research, with special attention to the operationalization of religiousness. First, the most obvious suggestion would be to include a more in-depth, longitudinal measure of religiousness, as this study lacked such a measure. For example, it would then be possible to answer whether changes in someone's religious behavior or commitment is associated with anxiety. Or to include the role of affective and cognitive god representations, representing the believing and bonding dimension of religion (Saroglou, 2011) in the development and course of anxiety disorders (Rosmarin and Leidl, 2020). It is plausible that a supportive god image may help to prevent or reduce feelings of anxiety, while a

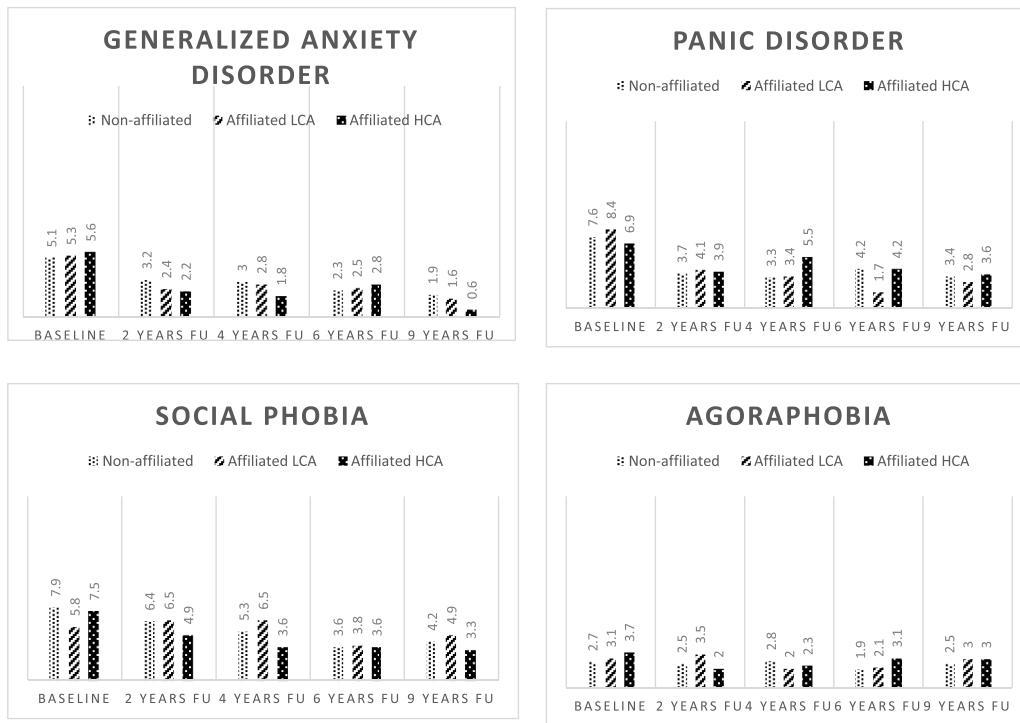


Fig. 1. Group differences in prevalence of specific anxiety disorders in the last month at baseline and follow-up (FU).

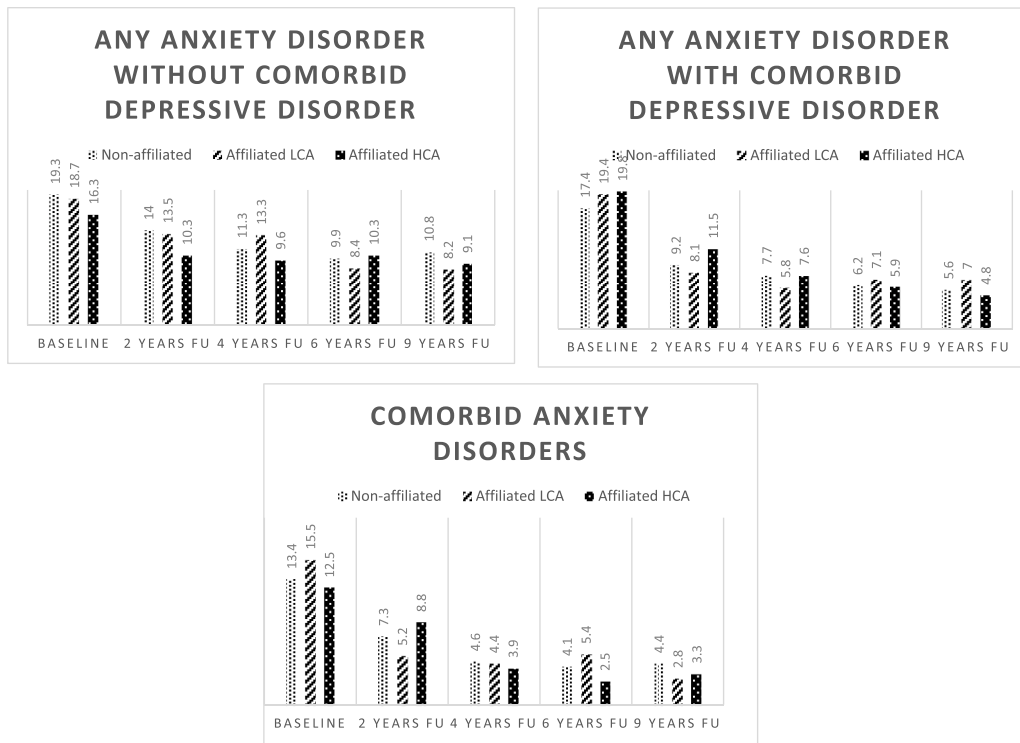


Fig. 2. Group differences in prevalence of any anxiety disorder and comorbid anxiety disorders in the last month at baseline and follow-up (FU).

more negative god image could actually increase anxiety or make it more difficult to manage. Furthermore, it could also examine the bidirectional nature as, for example, religious behavior such as attendance or prayer may also increase when people experience increased anxiety. Koenig et al., (2024) refer to this as the possibility of a reverse causation dynamic between anxiety and religion. Second, follow-up studies could also address religious struggles in relation to the course of anxiety, as a

recent qualitative study showed that patients with an anxiety disorder and cluster C personality disorder experience existential uncertainty and doubt, troubles with anger toward God and others, and self-blame and reticence in religious or spiritual relationships (Van Nieuw-Amerongen-Meeuse et al., 2023). Last, a third line of research may focus on interventions when anxiety is actually religion-related, such as people suffering from religious obsessive-compulsive disorders (Siev et al.,

Table 3
Course of severity of anxiety symptoms in participants with an anxiety disorder.

	First model				Second model corrected for IDS total score					
	Estimate (SE)	Confidence Interval 95%		t-value	p	Estimate (SE)	Confidence Interval 95%		t-value	p
		Lower bound	Upper Bound				Lower bound	Upper Bound		
Social Phobia (N = 220)										
<i>Overall effect estimate</i>										
1 vs 0	-1.75 (1.32)	-4.35	0.85	-1.33	.19	-0.71 (0.87)	-2.42	1.00	-0.82	.42
2 vs 0	-0.40 (1.34)	-3.06	2.25	-0.30	.77	0.22 (0.89)	-1.53	1.98	0.25	.80
Panic disorder (N = 229)										
<i>Overall effect estimate</i>										
1 vs 0	-0.36 (1.51)	-3.33	2.61	-0.24	.81	0.46 (0.94)	-1.39	2.30	0.49	.63
2 vs 0	2.67 (1.84)	-0.97	6.30	1.45	.15	0.20 (1.15)	-2.06	2.47	0.18	.86
Generalized anxiety disorder (N = 156)										
<i>Overall effect estimate</i>										
1 vs 0	-0.53 (1.34)	-3.19	2.12	-0.40	.69	0.33 (1.04)	-1.72	2.39	0.32	.75
2 vs 0	0.06 (1.44)	-2.78	2.90	0.04	.97	0.75 (1.11)	-1.45	2.95	0.67	.50
Comorbid anxiety disorders (N = 408)										
<i>Overall effect estimate</i>										
1 vs 0	-0.73 (1.18)	-3.06	1.59	-0.62	.54	0.25 (0.67)	-1.06	1.56	0.38	.71
2 vs 0	0.12 (1.45)	-2.73	2.97	0.08	.93	-1.09 (0.82)	-2.70	0.52	-1.33	.19
Any anxiety disorder without comorbid depressive disorder (N = 559)										
<i>Overall effect estimate</i>										
1 vs 0	0.03 (0.83)	-1.60	1.66	0.03	.98	0.43 (0.53)	-0.61	1.48	0.81	.42
2 vs 0	-0.71 (0.99)	-2.65	1.23	-0.72	.47	-0.19 (0.63)	-1.43	1.06	-0.29	.77
Any anxiety with comorbid depressive disorder (N = 542)										
<i>Overall effect estimate</i>										
1 vs 0	-0.99 (1.03)	-3.02	1.03	-0.97	.34	0.40 (0.66)	-0.90	1.70	0.60	.55
2 vs 0	0.76 (1.14)	-1.49	3.01	0.66	.51	0.33 (0.74)	-1.13	1.78	0.44	.66

Note. LLM for the effect of the groups on BAI total score (average effect based on baseline, 2-year, 4-year, 6-year and 9 year follow-up). 0=non-affiliated group, 1=affiliated low commitment/attendance group, 2= affiliated higher commitment/attendance group. Overall effect model 1: including random intercept and random slope and group, age and sex variable. Corrected model included IDS total score follow-up scores.

2011). For these people, it would be interesting to learn which aspects or cognitions from their religiousness may help or hinders reducing the anxiety.

The lack of significant differences in our study may also have implications for clinical practice, although these may be less clear on the level of an individual patient. Being religious and reporting more or less religious attendance and commitment at baseline was on average not associated with the prevalence of anxiety disorders or with the severity of anxiety in participants with an anxiety disorder, both at baseline and over time. On population level, this may suggest that whether or not people are religious, with more or less religious behavior, they all may have the risk of suffering from an anxiety disorder at some point of their lives. It is part of the universality of suffering. Furthermore, it may suggest that they all may benefit from well-known general treatment interventions, such as exposure or cognitive behavioral therapy (Butler et al., 2006; Norton and Price, 2007). However, for individual religious patients it may be valuable to incorporate their religiousness into therapy. For this group the incorporation seems to be at least equally effective as regular therapy when it comes to psychological outcomes (Anderson et al., 2015; Bouwhuis-van Keulen et al., 2023; Captari et al., 2018), but may also enhance the treatment alliance (Van Nieuw Amerongen-Meeuse et al., 2020) and may lead to recovery on other domains as well (e.g., spiritual well-being; Captari et al., 2018; 2022).

4.2. Strengths and limitations

To our knowledge, this is the first longitudinal study examining the association between religiousness and specific anxiety disorders, following a large group of participants (e.g., with a comparable mean age to the overall population (42.4 years; Statistics Netherlands, 2023)). Next to examining the prevalence of specific anxiety disorders in a mixed group of both healthy controls and people with (sub)clinical anxiety, we were able to examine the anxiety severity in representative group of 1101 participants with an anxiety disorder at baseline. The use of the NESDA data made it possible to use their data at multiple follow

ups, however, it also restricted this study to three demographic and more belonging and behaving related questions about religion at baseline. We already mentioned that the operationalization of religion in three groups based on religious attendance and commitment to religious affiliation is lacking specificity. Furthermore, this cohort study did not include measures of religiousness at follow-up making it not possible to control for or integrate possible changes in someone's religiousness over time in the analyses. That is one major limitation in the design. Statistics Netherlands has for example showed that the group who reports to be affiliated to a religion or philosophy of life has dropped from 80% in 1960 and 60% around 2000 (Smeets, 2020) to 53.8% in 2012 (that is within the period of six year follow up in the NESDA study) and 42.8% in 2022 (Smeets and Houben, 2023). So it is likely that there are people included who reported to be religiously affiliated at baseline, but were not anymore at a follow-up measurement. Still, at baseline, where religion was asked, we also did not find significant differences between the groups, with regard to the prevalence of specific anxiety disorders or the severity of anxiety problems.

A second limitation is that it was not possible to control for whether or not participants followed any treatment, because we know that this is a factor that can have a large effect on the course of anxiety disorders (Emmelkamp and Ehring, 2014). Next to this, it may be possible that these results primarily represent people with or without anxiety disorders (receiving treatment) who are willing to complete measurements over a long period of time, rather than people who are not so much interested to do so (or who are not able to because of the severity of their problems). Third, the group with severe anxiety symptoms, who do not meet the criteria of the DSM (so-called subthreshold anxiety disorders) was missed. Previous research has shown that patients with subthreshold anxiety disorders show significant impairments and costs to healthcare (Bystritsky et al., 2010; Haller et al., 2014) and are therefore important to include in further research. Fourth, our results are limited to the prevalence of anxiety disorders and the severity of anxiety over time in people with an anxiety disorder at baseline. We did not, for example, analyze religiousness in the context of the development or

incidence of anxiety disorders. However, then again, it might be that our more behavior-related measures of religiousness may not be related to more or less anxiety on a population level, as proposed by Rosmarin and Leidl (2020), and therefore may not lead to different incidence scores in the three different groups.

A fifth limitation is that the sample only consisted of people from a Dutch population, of which most religious participants report a Christian affiliation. Furthermore, we only included a measure of organized religious activities (attendance) and of commitment. Although it may be plausible, we therefore do not know whether our population-based results would be comparable when other religions (in non-Western societies) are included (for example, with more focus on non-organized religious activities and/or where commitment to one's affiliation is experienced differently). Last, even though the absolute age differences between groups at baseline were small and therefore not a clear indication of a possible age effect in this study (that is, older people are more often religious than younger people), a cohort effect may still be present (e.g., the weakened effect of Christian socialization leading to lower affiliation numbers over time among those being socialized in a Christian tradition, as proposed by Kregting et al. (2018)). So when a comparable group would be included now, the distribution among the different groups may be different and the relationship – positive or negative – with one's religiousness or philosophy of life might be weaker on a population level.

5. Conclusions

Overall, the results showed no significant associations between religiousness, as measured by religious affiliation, attendance and commitment at baseline, and the prevalence of specific anxiety disorders and anxiety severity over time, indicating that being religiously affiliated is not a significant factor in (the course of) anxiety on a clinical population level. What is important, however, is that religiousness is a broader concept than just a demographic characteristic, in which different aspects (such as affiliation and attendance as more behavioural and struggles or god images as more cognitive and/or emotional) may have different relationships with anxiety. Regarding demographical/behavioural measures of religion, this may lead to the finding of small bi-directional or, in our case, non-significant associations between religiousness and anxiety. This study may provide longitudinal proof for this hypothesis. For further research, rather than using a more epidemiological perspective we suggest to focus on more well-defined internal religious aspects that may be related to anxiety, and more specifically to study this relationship in religious people or with specific religion related anxiety.

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Data availability statement

The data that support the findings of this study are available from the Netherlands Study of Depression and Anxiety (NESDA). Restrictions apply to the availability of these data, which were used under license for this study. Data are available from the corresponding author with the permission of NESDA.

CRedit authorship contribution statement

Johan H. Bos: Writing – original draft, Formal analysis, Conceptualization. **Cis Vrijmoeth:** Writing – review & editing, Formal analysis, Conceptualization. **Johanna H.M. Hovenkamp-Hermelink:** Writing – review & editing, Conceptualization. **Hanneke Schaap – Jonker:** Writing – review & editing, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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