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Does Religiosity/Spirituality Play a Role in Function, Pain-Related Beliefs, and Coping in Patients with Chronic Pain? A Systematic Review

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Abstract

This systematic review examined the extent to which measures of religiosity/spirituality (R/S): (1) are associated with pain, function, pain-related beliefs (beliefs), coping responses, and catastrophizing in people with chronic pain; and (2) moderate the association between beliefs, coping and catastrophizing, and pain and function. Experimental and observational studies examining at least one of these research questions in adults with chronic pain were eligible. Two reviewers independently performed eligibility screening, data extraction, and quality assessment. Twenty studies were included. Most studies focused on the association between R/S and pain or function. When significant associations emerged, those between R/S and psychological function were weak to strong and positive; those between religious/spiritual well-being and pain and physical dysfunction were negative, but weak. Few studies examined the associations between R/S and beliefs/coping/catastrophizing; none examined the moderation role of R/S. The findings suggest that R/S is associated with pain and psychological function in people with chronic pain, and that viewing oneself as being "spiritual," regardless of religion, may contribute to positive psychological adjustment. More research is needed to determine the reliability of this finding. PROSPERO registry CRD42018088803.

Keywords Systematic review · Chronic pain · Religiosity/spirituality · Pain-related beliefs · Coping responses

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Introduction

Chronic pain is a significant health problem estimated to affect 20–30% of the world's population (Breivik et al. 2006; Kroska 2016). It has a significant negative impact on both society and individuals, significantly interfering with all aspects of the life of the person with chronic pain (Adams and Turk 2015; Azevedo et al. 2012; Breivik et al. 2006; Gouveia and Augusto 2011; Jensen and Turk 2014; Morlion et al. 2008).

Chronic pain is a multidimensional and subjective biopsychosocial experience (Morley and Williams 2015; Turk et al. 2008; de Williams et al. 2012). Research performed over the last few decades has identified a number of psychosocial variables that are associated with adjustment to chronic pain. These include pain-related beliefs and attributions, pain-coping responses, mood, social support, and environmental responses to patient's pain behavior (da Costa et al. 2011; Ferreira-Valente et al. 2014; Miró et al. 2014; Osborne et al. 2007).

Beliefs have been defined as relatively strongly held assumptions about oneself, the world, and events (Beck 1995; Ellis and Harper 1997; Lazarus and Folkman 1984; Thorn 2004; Young 2003). These cognitive constructs—thoughts, attributions, attitudes, and appraisals—either personally formed or culturally shared, are the lens used by individuals to interpret the meaning of events, shaping the way people cope with stressors (e.g., the experience and impact of pain; (DeGood and Tait 2001; Lazarus and Folkman 1984; Thorn 2004). Previous research has examined the associations between pain-related beliefs and adjustment to pain, showing that some beliefs tend to be associated with better adjustment (e.g., belief in personal control over pain), while others tend to be associated with greater dysfunction and disability (e.g., belief that activities cause pain and fear and should be avoided; Ferreira-Valente et al. 2014; Jensen et al. 2003; Nicholas 2007; Osborne et al. 2007; Vlaeyen et al. 1995; Vlaeyen and Linton 2000).

Coping responses represent everything a person thinks or does to deal with a given stressor (Lazarus and Folkman 1984). Because having a chronic pain condition often involves multiple stressors and effects, there are many pain-coping responses; that is, attempts to manage one or more of pain's multiple domains or impacts. Pain-coping responses are unique to each individual and the strategies used can vary in the same individual over time (Dysvik et al. 2005; Esteve et al. 2007; López-Martínez et al. 2008).

Rather than viewing pain-coping responses as being inherently adaptive or maladaptive, coping's adaptability depends on a number of personal and contextual factors (e.g., the qualities of the stressor; the patient's goals and motivational level (Van Damme et al. 2008). Thus, coping responses' effects are best evaluated in light of their effects for any patient in each situation (Ramírez-Maestre et al. 2008). However, even though coping responses are situationally and culturally determined, and no coping response is adaptive or maladaptive in all contexts (Edwards et al. 2005; Ferreira-Valente et al. 2011), coping responses can be and often are classified into those that tend to be associated with better outcomes and adjustment (e.g., task persistence and ongoing active engagement), and those that tend to be associated with

worse outcomes and poor adjustment (e.g., guarding, pain-contingent rest, asking for assistance and praying or hoping; Esteve et al. 2007; Ferreira-Valente et al. 2011, 2014; Jensen et al. 2003; Osborne et al. 2007; Rodero et al. 2011).

A third response to pain–pain catastrophizing—has been viewed as either (or both) (1) a pain-related cognitive response reflecting beliefs about pain and (2) a coping response (Jensen et al. 1991; Thorn et al. 2003). Pain catastrophizing can be defined as an exaggerated and excessively negative evaluation of pain, leading a person to interpret pain as a threat, focus more on the negative features of pain and interpret physical arousal as pain cues (Sullivan et al. 1995; Vlaeyen et al. 1995; Vlaeyen and Linton 2000). Regardless of whether catastrophizing is best viewed as a coping response or as reflecting a set of pain-related beliefs, previous research has consistently shown the negative association between catastrophizing and positive health outcomes (Ferreira-Valente et al. 2011, 2014; Osborne et al. 2007; Sullivan et al. 1995; Vlaeyen et al. 1995; Vlaeyen and Linton 2000). For the purpose of this review, catastrophizing will be considered as a domain distinct from beliefs and coping.

Recent research that has examined the role of religion, religiosity, and spirituality shows that these factors may influence pain experience and function in individuals with chronic pain (Baetz and Bowen 2008; Büssing et al. 2009; Glover-Graf et al. 2007; Rippentrop 2005). Religion, religiosity, and spirituality are significant and universal aspects of human experience across cultures and time (Russo-Netzer 2018). However, there is yet no clear consensus as to the definition of these constructs (Closs et al. 2013). Terms are often used interchangeably or inconsistently and without operational definitions (Büssing et al. 2007; Closs et al. 2013; Rippentrop et al. 2005). Moreover, measures used to assess both religiosity and spirituality often cover non-overlapping dimensions (Austin et al. 2018; Jim et al. 2015). For the purpose of this review, a person's *religion* or religious affiliation is operationalized as that person's self-report of belonging to a religious group (or not). *Religiosity* is operationalized as scores on measures of the degree of one's engagement with the beliefs/practices of a religion (Closs et al. 2013; Jim et al. 2015). Finally, *spirituality* is operationalized as scores on measures assessing the extent to which a person has or is searching for meaning and purpose in life and feelings of transcendence and connectedness to a higher power (Closs et al. 2013; Jim et al. 2015).

As noted by Rippentrop (2005), research on the role of religion and religiousness/spirituality on chronic pain can be classified as falling into four categories: (1) surveys documenting the frequency of spiritual/religious variables (e.g., religious/spiritual coping *vs.* non-religious/spiritual coping) in individuals with chronic pain, regardless of their religion (i.e., religious affiliation; Barry et al. 2004; Dunn and Horgas 2004; Glover-Graf et al. 2007; Pizutti et al. 2012); (2) cross-sectional studies assessing the association between measures of religion/spirituality, religious coping (*vs.* non-religious coping), psychosocial factors, and measures of adjustment to pain, regardless of the research participants' religion (Andersson 2008; Ashby and Lenhart 1994; Büssing et al. 2009; Hefti and Laun 2016; Rippentrop et al. 2005); (3) longitudinal studies examining how daily spiritual experiences and practices are associated with pain experience over time (Keefe et al. 2001); and (4) experimental studies in which the efficacy of a specific spiritual/religious intervention (e.g.,

meditation) is tested in individuals with chronic pain (McCauley et al. 2011). Taken together, the results of these studies suggest the possibility that religion, religiosity, and spirituality may influence pain and adjustment to pain via their effects on pain beliefs (the meaning attributed to, the appraisal of, and attitudes toward "pain") and coping (Cano et al. 2006; Dedeli and Kaptan 2013; Ferreira-Valente et al. 2011; López-Martínez et al. 2008; Lysne and Wachholtz 2011; Rippentrop et al. 2005; Thong et al. 2017).

Thus, this research leads to questions regarding the extent that religious/spiritual beliefs and practices may be associated with cognitive and emotional responses, which in turn may be related with (1) biological responses, (2) decisions to use a specific set of coping responses, (3) the experience of pain, and (4) physical function (Dunn and Horgas 2004; Wachholtz et al. 2007). However, a systematic review of the research literature regarding the role that religiosity and spirituality have on adjustment to chronic pain, pain-related beliefs, coping, and catastrophizing has not yet been performed.

Given these considerations, the aims of this study was to perform a systematic review in order to examine: (1) whether religiosity and spirituality (hereafter called "religiosity/spirituality") are associated with measures of pain, physical function, and psychological function (hereafter called "function") in individuals with chronic pain; (2) the extent to which pain-related beliefs, pain-coping responses and catastrophizing are associated with measures of religiosity/spirituality; and (3) the extent to which the associations between pain-related beliefs, pain-coping responses, and catastrophizing, on the one hand, and measures of function, on the other hand, are moderated by religiosity and/or spirituality. We hypothesized that: (1) more religious engagement and higher scores on measures of spirituality are associated with better adjustment to pain (improved function), relative to not being affiliated with a religion, less religious engagement, and lower scores on measures of spirituality in individuals with chronic pain; and (2) the association between measures of function, on the one hand, and pain-related beliefs, coping responses and catastrophizing, on the other hand, will be moderated by the degree of spirituality or religiousness. The findings from this systematic review can be used to help develop a theoretical model of the role that religion, religiosity, and/or spirituality play in adjustment to pain. Such model could serve as the basis for a research program in this area, and to understand how treatments might be most effectively adapted from one religious group to another to maximize beneficial outcomes.

Methods

Review Protocol and Registration

This systematic review was prospectively registered in PROSPERO (CRD42018088803). The PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) statement (Moher et al. 2009) and Meta-analysis Of Observational Studies in Epidemiology (MOOSE) guidelines (Stroup 2000) were followed for both the conduct and reporting of this systematic review.

Eligibility Criteria

Articles were included in this systematic review if they: (1) included adults (i.e., participants who were 18 years old or older) with chronic pain (defined as persistent and recurrent pain lasting for at least three months; Treede et al. 2015), or identified as having chronic pain by the study investigators or having a primary medical condition often associated with chronic pain; (2) included quantitative measure(s) of function, pain-related beliefs, pain-coping responses, or catastrophizing (hereafter referred to as "criterion variables"); (3) assessed the association between measures of spirituality or religiosity and measures of at least one criterion variable, or studied the moderation effect of spirituality or religiosity in the association(s) between measures of adjustment to pain and measures of pain-related beliefs or coping responses; (4) were an observational study (cohort, case–control, and cross-sectional) or a clinical trial providing information about the association between spirituality or religiosity (assessed by at least one measure of spirituality/religiosity) and at least one criterion variable; (5) were published in English, Spanish, Portuguese, or Italian before December 21, 2018. While including only studies written in these languages is restrictive, the authors are only proficient in these languages and did not have at their disposal the resources to include articles written in other languages in the screening and in the review.

The inclusion criteria we initially proposed in the PROSPERO protocol included studies that studied samples who were "adults (i.e., 18 years old or older) with chronic pain (defined as pain lasting for at least 3 months)," and studies assessing at least one criterion variable in at least one religious group. However, few of the authors of identified studies reported the duration of pain of their study participants. We therefore modified the inclusion criteria to include studies that explicitly said that they included participants with "chronic pain" or who had a primary medical condition often associated with chronic pain (Bartlett et al. 2003; Basinski et al. 2013; Büssing and Koenig 2008; Büssing et al. 2009; Cooper-Effa et al. 2001; Dezutter et al. 2009, 2010; Harris et al. 2017; Harrison et al. 2005; Keefe et al. 2001; McParland and Knussen 2010; Meier 1982; Nsamenang et al. 2016; Offenbaecher et al. 2017; Rzeszutek et al. 2017). Also, the aims we initially proposed in the PROSPERO protocol for this systematic review included examining whether religion is associated with measures of pain and function and the extent to which pain-related beliefs, pain-coping responses, and catastrophizing in adults with chronic pain are different or similar in people with different religious affiliations. However, we later omitted this aim as well as the analyses and results related with these comparisons from this review due to ethical concerns. Specifically, we were concerned that identifying differences between religious groups could contribute to increase stigma for specific groups. Thus, while the potential of such findings to improve care is limited—as clinicians cannot ethically recommend that a patient change his/her religious affiliation—these findings have the potential to do harm. As a result, we modified the inclusion criteria in order to not include studies examining at least one criterion variable in at least one religious group. Studies with less than 20 participants, narrative reviews, editorials, letters, qualitative studies, or feasibility studies were excluded from the systematic review.

Search Strategy

We searched 14 electronic databases, including: Web of Science Core Collection, MEDLINE, SCIELO Citation Index (via Web of Science, Carivate Analytics), EMBASE, Cochrane Central Register of Controlled Clinical Trial (via OvidSP), PsycINFO, CINAHL (via EBSCO host), ASSIA (Applied Social Sciences Index and Abstracts), IBSS (International Bibliography for Social Sciences Index and Abstracts) (via Proquest), Scopus, PUBMED, Google Scholar, LILACS, and OpenSIGLE. Unpublished literature was also searched in clinical trial registry platforms, such as ClinicalTrials.gov and ISRCTN registry. Then, the reference lists of eligible articles and of review articles found by the search were hand searched to identify additional studies eligible for inclusion.

All searches were conducted between March 9, 2018, and March 23, 2018, (initial search), and then again on December 21, 2018 (pre-submission search). Two reviewers (AFV and SS) worked with a university librarian to create a search algorithm. Search terms we used to search for publications regarding religiosity were: (1) Pain AND (2) Religion AND (3) Coping OR Belief OR Catastrophizing OR Function. Those used to search for publications relative to spirituality were: (1) Pain AND (2) Spirituality AND (3) Coping OR Belief OR Catastrophizing OR Function. The search terms were used in various combinations. Detailed search strategy for MEDLINE search is given in Supplementary files 1 and 2. Search strategies were customized to suit each database.

Study Selection

All references identified in the search were listed in EndNote X8 (Clarivate Analytics, Philadelphia, USA). Cross-references and duplicates were then removed. Title and abstract of identified studies were screened for eligibility by two independent reviewers (AFV reviewed all studies, and JPR and ST reviewed the same studies, with each reviewing 50%). Full texts of the articles that fully met the eligibility criteria or that, based on the title and abstract, could potentially meet the eligibility criteria, were obtained and each was read twice by the same independent reviewers (AFV all studies, JPR and ST all studies, with each reading 50% of the studies). Discrepancies related to article eligibility were settled during a consensus meeting. In cases in which consensus was not achieved, a third reviewer (MPJ) was consulted. Inclusion/exclusion of the studies was recorded on a screening form in Microsoft Excel 2013.

Data Management and Data Extraction

Detailed data from included studies were extracted on a Microsoft Excel extraction sheet created for this purpose by two independent reviewers (AFV extracted data from all included studies, and together SS and ST also extracted data from all of the studies, with each extracting data from 50% of the included studies). Data extracted from included studies were authors and year of publication, country of origin, study

design, sample size, sociodemographic characteristics of the study participants [age (mean, standard deviation), percentage of female participants, education level, employment status and occupation, income], and participants' pain history (chronic pain etiology, duration of pain, pain location). Statistics (mean, standard deviation, or effect sizes) on measures of religiosity and/or spirituality and criterion measures (pain intensity, pain interference and/or pain-related disability, function, pain-related beliefs, coping responses and catastrophizing) were also extracted for the total score or subscales or both whenever possible for the total sample. Different types of pain beliefs, coping, and catastrophizing were separately coded for each subscale of the measures used in each study. Finally, the statistical measure(s) of association between measures of spirituality and/or religiosity and criterion measures were also extracted. If a given study did not report complete data, we e-mailed the authors with a request to provide data. Discrepancies in the data extracted were settled by discussion during a consensus meeting. In the cases in which consensus was not achieved, a third senior reviewer (MPJ) was consulted.

Study Quality Assessment

The methodological quality (i.e., the opposite of risk of bias) of each study was assessed twice by the same independent reviewers that performed data extraction (AFV rated all of the studies, and SS and ST each rated 50% of the studies). It was evaluated using STROBE checklist (von Elm et al. 2007), which was modified to fit the study purposes. Discrepancies were settled by discussion during a consensus meeting, and any disagreements that remained following this were resolved by a senior author (MPJ). A total of nine items were included to assess methodological quality: one item for detection bias, two items for selection bias, two items for statistical methods, two items for reporting bias and two items for performance bias (*cf.* Supplementary file 3). An addition methodological quality criterion to evaluate the validity and reliability of outcome measures used (including translation process of the patient-reported measures on pain-related beliefs and coping) was added, as it is difficult to interpret results using scales with inadequate validity or reliability. Each methodological quality item was scored as "Yes" (=1), "No" (=0) or "Unclear" (=?). For each included study, a total methodological quality score was computed as a percentage, by dividing the number of points earned by the total number the study was eligible to receive. Higher percentage indicated better study quality. Study quality scores were categorized as low (<50%), medium (50–80%), and high (>80%) (A. M. Harrison et al. 2015; Scott et al. 2018). No studies were excluded based on study quality assessment.

Data Analysis

We had originally planned to perform a meta-analysis of the findings if possible. However, the included studies were too heterogeneous for a meta-analysis to be conducted (Eden et al. 2011). Heterogeneity between included studies was observed in the sample characteristics and in the varying approaches used to assess religious

affiliation, religiosity/spirituality, and the criterion measures. Therefore, only a qualitative synthesis of the results was conducted. The qualitative synthesis was performed by one reviewer (AFV), who maintained regular meetings with the senior reviewer (MPJ) to review emerging findings and patterns.

Qualitative Synthesis

A qualitative synthesis of the body of research was performed (Eden et al. 2011), describing the methodological characteristics of the included studies, their strengths and limitations, and each study's results regarding the influence of religion/spirituality on the association between pain-related beliefs/coping responses and measures of function.

In order to summarize the evidence concerning these two topics, we employed a narrative summary synthesis method based on the framework developed by the UK Economic and Social Research Council to conduct narrative synthesis in systematic reviews (Popay et al. 2006), modified to fit our purposes. Following the referred guidance, the synthesis process involved three elements: (1) developing a preliminary synthesis of findings of included studies regarding the two topics; (2) exploring relationships in the data; and (3) assessing the robustness of the synthesis. To develop and present the narrative synthesis, we used several tools proposed by Popay et al. (2006), including: (1) textual description of the studies; (2) grouping/clustering the included studies according to the nature of the results being reported; (3) tabulation of the included studies characteristics and findings; and (4) subgroup analysis according to included studies design.

Addressing Missing Data

If a specific study did not provide complete data, we contacted the authors to request the missing data. In the event of a non-response from the authors, we sent a second email after about 2 weeks. Whenever authors failed to report any requested data, missing information was reported as "*unknown*" in the Results.

Results

Study Selection

Detailed results of the search, screening and selection process, as well as reasons for full-text articles exclusion, are presented on Fig. 1. The systematic literature searches resulted in 431 potentially relevant studies identified after removing duplicates. After screening titles and abstracts, a total of 329 articles were excluded from the review. We, then, read full texts of 96 articles, from which 15 met the eligibility criteria. A hand search of the reference lists from eligible articles and of review articles identified in the searches resulted in the identification of another 34 potentially relevant studies, of which four met the eligibility criteria and were included in the

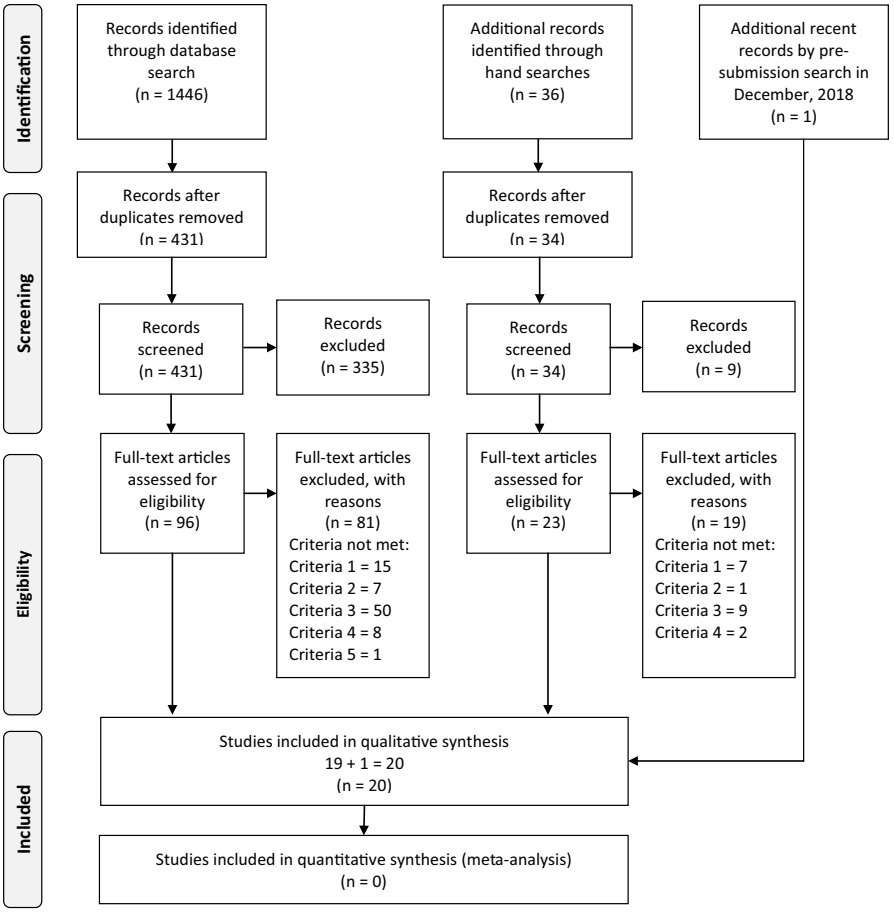

Fig. 1 PRISMA flow diagram

review. One additional study was identified during pre-submission search in December 21, 2018. A total of 24 studies met the eligibility criteria initially defined.

The aims we initially proposed in the PROSPERO protocol for this systematic review included examining whether religion is associated with measures of pain and function and the extent to which pain-related beliefs, pain-coping responses and catastrophizing in adults with chronic pain are different or similar in people with different religious affiliations. The four studies (Basinski et al. 2013; Brasil et al. 2008; Offenbaecher et al. 2017; Parenteau et al. 2011) examining such comparisons were not included in this review, and analyses and results related with these comparisons, were omitted from this review due to ethical concerns, as previously noted. Thus, 20 studies were included in the final analysis of the systematic review.

Description of the Included Studies

Study Design and Setting

Table 1 presents the characteristics of the studies included in the review. The 20 included studies were published between 1982 and 2018; 19 (95%) of the studies were published between 2001 and 2018. Most studies ($n = 12$ [60%]) were conducted in the USA (Ammondson 2009; Bartlett et al. 2003; Cooper-Effa et al. 2001; Dunn 2005; Harris et al. 2017; Harrison et al. 2005; Keefe et al. 2001; Lavin and Park 2011; Meier 1982; Nsamenang et al. 2016; Rippentrop et al. 2005; Ruzicka et al. 2007). All but one study ($n = 19$ [95%]) were cross-sectional observational studies, while one was a descriptive and exploratory mixed-method study (Ammondson 2009).

Participants' Characteristics

The included studies' samples included data from a total of 3251 participants. Study sample sizes ranged from 35 (Keefe et al. 2001) to 580 (Büssing et al. 2009) participants ($M = 162.55$, SD = 138.12). Most studies ($n = 13$ [65%] studies) included participants with a variety of chronic pain conditions (Ammondson 2009; Büssing and Koenig 2008; Büssing et al. 2009; Dezutter et al. 2009, 2010, 2011; Dunn 2005; Harris et al. 2017; Lavin and Park 2011; McParland and Knussen 2010; Meier 1982; Rippentrop et al. 2005; Ruzicka et al. 2007). Among the seven studies with a homogeneous sample, the most commonly studied conditions were rheumatoid arthritis ($n = 3$ [15%]; Bartlett et al. 2003; Keefe et al. 2001; Rzeszutek et al. 2017), followed by sickle cell disease ($n = 2$ [10%]; Cooper-Effa et al. 2001; Harrison et al. 2005).

In most studies ($n = 17$ [85%] studies), participants were predominantly women (range 56–95%), with only three studies (Gomes et al. 2018; Harris et al. 2017; Lavin and Park 2011) having enrolled predominantly men (range 58–88%), and one study (Ruzicka et al. 2007) with unknown number of women or men. In 12 out of 13 studies (60%) for which the participants' average age was known, participants were middle-aged or older, with the mean age at the time of study enrollment ranging from 53 to 76 years old (Ammondson 2009; Bartlett et al. 2003; Büssing and Koenig 2008; Büssing et al. 2009; Dunn 2005; Harris et al. 2017; Keefe et al. 2001; McParland and Knussen 2010; Meier 1982; Nsamenang et al. 2016; Rippentrop et al. 2005; Rzeszutek et al. 2017). Fourteen studies (70%) reported participants' religious affiliation (Ammondson 2009; Bartlett et al. 2003; Büssing and Koenig 2008; Büssing et al. 2009; Dezutter et al. 2009, 2010, 2011; Dunn 2005; Gomes et al. 2018; Harris et al. 2017; Lavin and Park 2011; Meier 1982; Rippentrop et al. 2005; Ruzicka et al. 2007). Religions present in the included studies were Buddhism, Christianism, Judaism, Hinduism, believer with no specific religious affiliation, and no religious affiliation, among others.

Table 1 Characteristics of the included studies

Author (year)	Design	Population	Sample	Religious affiliation(s)	Measures	Analysis of interest
Ammondson (2009)	Descriptive and exploratory mixed-method	Autoimmune system illness Back, neck, and spine pain Fibromyalgia Arthritis Other	*N* = 38 28 (74%) women Age (*M*, SD): 54.03, 9.19 Pain duration (*M*, SD): 15, unknown	Buddhist Christian (Catholic, Protestant, non-denominational) Jewish Multiple Other No affiliation	Religiosity/spirituality: RES ASTI Pain and function: 0–10 NRS BSI (depression, anxiety, total score) Pain responses: None	A
Bartlett et al. (2003)	QO (CS)	Rheumatoid arthritis	*N* = 77 62 (81%) women; Age (*M*, SD): 54.73, unknown; Pain duration (*M*, SD): unknown	Christian (Catholic, Protestant); Other; No affiliation	Religiosity/spirituality: STS Pain and function: SF-36 CES-D-10 ABS Pain responses: None	A
Büssing and Koenig (2008)	QO (CS)	Chronic pain conditions	*N* = 229; 195 (85%) women; Age (*M*, SD): 53,60, 13.70; Pain duration (*M*, SD): unknown	Christian; Other; No affiliation	Religiosity/spirituality: BENEFIT Pain and function: None Pain responses: AKU[a]	C[a]
Büssing et al. (2009)	QO (CS)	Arthrosis, Cancer, Fibromyalgia, Migraine/headache, Spinal disorder, Other	*N* = 580; 464 (80%) women; Age (*M*, SD): 53.80, 14.40; Pain duration (*M*, SD): unknown	Christian; Other; No affiliation	Religiosity/spirituality: SpREUK Pain and function: None Pain responses: AKU[a]	C[a]

Table 1 (continued)

Author (year)	Design	Population	Sample	Religious affiliation(s)	Measures	Analysis of interest
Cooper-Effa et al. (2001)	QO (CS)	Sickle cell disease	*N* = 71; 42 (59%) women; Age (*M*, SD): unknown; Pain duration (*M*, SD): unknown.	Unknown	Religiosity/spirituality: SWBS Pain and function: WHYPMPI (pain severity, pain interference) Pain responses: None	A
Dezutter et al. (2009)	QO (CS)	Arthritis, Back or neck pain, Fibromyalgia, Headaches, Other	*N* = 155; 112 (72%) women; Age (*M*, SD): unknown; Pain duration (*M*, SD): 15.50, 10.51	Unknown	Religiosity/spirituality: Post-critical Belief Scale Pain and function: SWLS OHQ Pain responses: None	A
Dezutter et al. (2010)	QO (CS)	Chronic pain conditions	*N* = 207; 143 (69%) women; Age (*M*, SD): unknown; Pain duration (*M*, SD): 16, 10.81	Christian (Catholic, other); Other; Believer with no affiliation; No affiliation	Religiosity/spirituality: CRMSS Pain and function: 0–10 NRS Pain responses: None	A
Dezutter et al. (2011)	QO (CS)	Chronic pain conditions	*N* = 202; 143 (71%) women; Age (*M*, SD): unknown; Pain duration (*M*, SD): 15, 10.55	Christian (Catholic, other); Other; Believer with no affiliation; No affiliation	Religiosity/spirituality: Frequency of prayer Pain and function: 0–10 NRS Pain responses: COPE (positive reinterpretation, growth)[a]	A and C[a]

Table 1 (continued)

Author (year)	Design	Population	Sample	Religious affiliation(s)	Measures	Analysis of interest
Dunn (2005)	QO (CS)	Chronic pain conditions	*N* = 200; 154 (77%) women; Age (*M*, SD): 76.36, 6.55; Pain duration (*M*, SD): 12, 177.03	Christian (Catholic, Protestant, other); Jewish; Other	Religiosity/spirituality: JAREL Spiritual Well-being Scale Pain and function: VDS pain intensity Pain responses: Behavioral and cognitive coping[a] RPS[a]	A and C[a]
Gomes et al. (2018)	QO (CS)	Chronic kidney disease	*N* = 50; 21 (42%) women; Age (*M*, SD): unknown; Pain duration (*M*, SD): unknown	Christian (Catholic, Evangelic, other); Spiritist	Religiosity/spirituality: EEPP-R Pain responses: SOPA-28	B
Harris et al. (2017)	QO (CS)	Subacute or chronic pain	*N* = 436; 52 (12%) women; Age (*M*, SD): 64, 12; Pain duration (*M*, SD): unknown	Christian (Catholic, Protestant); Jewish; Other; No affiliation	Religiosity/spirituality: RSSS Pain and function: PROMIS PIS PHQ-8 (depression) Pain responses: PCS	A and D
Harrison et al. (2005)	QO (CS)	Sickle cell disease	*N* = 50; 28 (56%) women; Age (*M*, SD): 36.80, 12.10; Pain duration (*M*, SD): unknown	Unknown	Religiosity/spirituality: DRI Pain and function: VAS SCL-90 (depression, anxiety, somatization, interpersonal sensitivity, hostility) Pain responses: None	A

Table 1 (continued)

Author (year)	Design	Population	Sample	Religious affiliation(s)	Measures	Analysis of interest
Keefe et al. (2001)	QO (Cohort)	Rheumatoid arthritis	*N* = 35; 31 (89%) women; Age (*M*, SD): 60.17, 11.40; Pain duration (*M*, SD): unknown	Unknown	Religiosity/spirituality: BMMRS DSPE Pain and function: RADAR pain intensity items POMS (positive mood, negative mood) Pain responses: BMMRS-RSCS[a]	A and C[a]
Lavin and Park (2011)	QO (CS)	Chronic pain conditions	*N* = 163; 51 (31%) women; Age (*M*, SD): unknown; Pain duration (*M*, SD): unknown	Christian (Catholic, Protestant); Jewish; Other; No affiliation	Religiosity/spirituality: SWBS EWB Pain and function: BPI pain intensity BPI pain interference OARS ADL CES-D-10 Pain responses: None	A
McParland and Knussen (2010)	QO (CS)	Arthritis, Fibromyalgia	*N* = 95; 86 (91%) women; Age (*M*, SD): 66.23, 11.44; Pain duration (*M*, SD): 16.21, 14.66	Unknown	Religiosity/spirituality: Dichotomous: (does not) hold religious belief Pain and function: 0–10 NRS CPG GHQ-28 psychological distress Pain responses: None	A

Table 1 (continued)

Author (year)	Design	Population	Sample	Religious affiliation(s)	Measures	Analysis of interest
Meier (1982)	QO (CS)	Chronic pain conditions	*N* = 60; 35 (58%) women; Age (*M*, SD): 65.20, 13.98; Pain duration (*M*, SD): unknown	Jewish	Religiosity/spirituality: MRCS Pain and function: BDI Pain responses: None	A
Nsamenang et al. (2016)	QO (CS)	Multiple sclerosis	*N* = 81; 64 (79%) women; Age (*M*, SD): 58, 8.80; Pain duration (*M*, SD): unknown	Unknown	Religiosity/spirituality: FACIT-SP Pain and function: MSQOLI pain effect (pain interference) CES-D-20 Pain responses: None	A
Rippentrop et al. (2005)	QO (CS)	Arthritis, Trauma, Other	*N* = 122; 68 (56%) women; Age (*M*, SD): 52.70, 16.30; Pain duration (*M*, SD): unknown	Christian (Catholic, Protestant, other, non-denominational); Hindu; Jehovah's Witness; Mormon; Mystical; Transcendental Meditation; Unitarian; No affiliation	Religiosity/spirituality: BMMRS Pain and function: MPI pain interference SF-36 Pain responses: None	A
Ruzicka et al. (2007)	QO (CS)	Arthritis, Cancer	*N* = 150; unknown number of women; Age (*M*, SD): unknown; Pain duration (*M*, SD): unknown	Christian; Other	Religiosity/spirituality: SWBS Pain and function: VAS SIP-BCM (disability, psychological function) Pain responses: PBQ	A and B

Table 1 (continued)

Author (year)	Design	Population	Sample	Religious affiliation(s)	Measures	Analysis of interest
Rzeszutek et al. (2017)	QO (CS)	Rheumatoid arthritis	*N* = 250; 167 (67%) women; Age (*M*, SD): 49.26, 15.07; Pain duration (*M*, SD): unknown	Unknown	Religiosity/spirituality: Self-Description Questionnaire Pain and function: PTGI Pain responses: None	A

[a]Not pain specific coping measure; QO (CS): Quantitative Observational study (Cross-sectional study); A: Evaluates the correlation between religiousness/spirituality and pain (intensity/interference), or physical/psychological function; B: Evaluates the correlation between religiousness/spirituality and pain-related belief(s); C: Evaluates the correlation between religiousness/spirituality and coping; D: Evaluates the correlation between religiousness/spirituality and catastrophizing; ABS: Affect Balance Scale; AKU: Adaptive Coping with Disease scale; ASTI: Adult Self-Transcendence Inventory; BENEFIT: SpREUK Spiritual and Religious Attitudes in Dealing with Illness; BDI: Beck Depression Inventory; BPI: Brief Pain Inventory; BMMRS: Brief Multidimensional Measure of Religiousness/Spirituality; BMMRS DSES: BMMRS 6-item Daily Spiritual Experience Scale; BMMRS RSCS: BMMRS Religious/Spiritual Coping Scale; BSI: Brief Symptoms Inventory; CES-D: Center for Epidemiological Studies: Depression; COPE: Coping Orientation to Problems Experienced Inventory; CPC: 7-item Chronic Pain Grade; CRMSS: Centrality of Religious Meaning System Scale; CSQ: Coping Strategies Questionnaire; DRI: Duke Religious Index; EEPP-R: Pinto and Pais-Ribeiro Spirituality Scale; FACIT-Sp: Functional Assessment of Chronic Illness Therapy-Spiritual Well-Being Scale; FSI: Functional Status Index; GHQ-Q: 28-item General Health Questionnaire; GDS: Geriatric Depression Scale; MPI: Multidimensional Pain Inventory; MRCS: Meier Religious Commitment Scale; MSQLI: Multiple Sclerosis Quality of Life Inventory; NRS: Numerical Rating Scale; OARS ADL: Older American Resources and Services Activities of Daily Living; OHQ: Short version of the Oxford Happiness Questionnaire; PBQ: Pain Beliefs Questionnaire; PCS: Pain Catastrophizing Scale; POMS: Profile of Mood States B; PTGI: Post-traumatic Growth Inventory; PCS: Pain Catastrophizing Scale; PHQ-8: Patient Health Questionnaire; PROMIS PIS: PROMIS Pain Interference Scale; RADAR: Rapid Assessment of Disease Activity in Rheumatology; RES: Religious Experience Scale; RPS: Short Form Religious Problem-Solving Scale; RSSS: Religious and Spiritual Struggles Scales; SCL-90: Symptoms Check List-90; SOPA-28: 28-item Survey of Pain Attitudes; SF-36/SF-12: Medical Outcomes Study Short Form 36/Medical Outcomes Study Short Form 12; SF-36/SF-12 PCS: SF-36/SF-12 Physical Component Summary; SF-36/SF-12 MCS: SF-36/SF-12 Mental Component Summary; SIP-BCM: Sickness Impact Profile-Body Care and Movement; SIP-EB: SIP-Emotional Behavior; SIP-SI: SIP-Social Interaction; SpREUK-P: SPREUK- Practices; STS: Spiritual Transcendence Scale; SWBS: Spiritual Well-Being Scale; SWBS EWB: Spiritual Well-Being Scale Existential Well-being subscale; SWLS: Satisfaction with Life Scale; VAS: Visual Analogue Scale; VDS: Verbal Descriptor Scale pain intensity index; WHYMPI: West Haven-Yale Multidimensional Pain Inventory

Nature of Findings and Statistical Analysis Conducted

Most studies ($n=17$ [85%]; Ammondson 2009; Bartlett et al. 2003; Cooper-Effa et al. 2001; Dezutter et al. 2009, 2010, 2011; Dunn 2005; Harris et al. 2017; Harrison et al. 2005; Keefe et al. 2001; Lavin and Park 2011; McParland and Knussen 2010; Meier 1982; Nsamenang et al. 2016; Rippentrop et al. 2005; Ruzicka et al. 2007; Rzeszutek et al. 2017) evaluated the association between religiosity/spirituality and function. Twelve (60%) of these studies conducted a correlational analysis only (Ammondson 2009; Bartlett et al. 2003; Dezutter et al. 2009, 2010, 2011; Harris et al. 2017; Lavin and Park 2011; McParland and Knussen 2010; Nsamenang et al. 2016; Rippentrop et al. 2005; Ruzicka et al. 2007; Rzeszutek et al. 2017). The remaining five studies (25%) conducted either regression analysis only ($n=2$ [10%]; Cooper-Effa et al. 2001; Meier 1982), both a regression analysis and independent samples t test ($n=1$ [5%]; Harrison et al. 2005), standardized maximum likelihood estimates for within-Pearson relations ($n=1$ [5%]; Keefe et al. 2001), or used structural equation modeling ($n=1$ [5%]; (Dunn 2005).

A total of 8 (40%) studies evaluated the association between religiosity/spirituality and either pain-related beliefs (Gomes et al. 2018; Ruzicka et al. 2007), coping responses (Büssing and Koenig 2008; Büssing et al. 2009; Dezutter et al. 2011; Dunn 2005; Keefe et al. 2001) or catastrophizing (Harris et al. 2017). Six (30%) of these studies conducted correlational analyses only (Büssing and Koenig 2008; Büssing et al. 2009; Dezutter et al. 2011; Gomes et al. 2018; Harris et al. 2017; Ruzicka et al. 2007), while one (5%) performed a standardized maximum likelihood estimate analysis for within-Pearson relations (Keefe et al. 2001). Another (5%) used structural equation modeling (Dunn 2005).

Measures of Religiosity/Spirituality Used

Table 2 provides a description of the religiosity/spirituality measures used in the studies included in this review. As can be seen, a number of different instruments were used to measure religiosity/spirituality, assessing a variety of domains. Measures of religiosity/spirituality ranged from a single-item measuring either the frequency of prayer (Dezutter et al. 2011) or the self-categorization of participants as holding (or not) a religious belief (McParland and Knussen 2010), to a 38-item scale assessing spirituality and religiosity (frequency of religious private or public/organizational practices, daily spiritual experiences, commitment to religious/spiritual beliefs and values, forgiveness, religious support, religious/spiritual coping, religious preference, religious/spiritual history, overall self-ranking as a religious/spiritual person; Rippentrop et al. 2005). The only measure of religiosity or spirituality that was used in more than one study was the Spiritual Well-being Scale (SWBS), which assesses the respondent's sense of well-being in relation to God and sense of life purpose and life satisfaction (Cooper-Effa et al. 2001; Ruzicka et al. 2007). The religiosity/spirituality domains assessed included religiosity (e.g., religious experience, frequency of religious practices; Ammondson 2009; Dezutter et al. 2010, 2011; Harrison et al. 2005; McParland and Knussen 2010; Meier 1982; Rippentrop et al. 2005), spirituality (e.g., daily spiritual experiences, transcendence;

Table 2 Religiosity and/or spirituality measures used in the included studies

Author (year)	Measures of religiosity/spirituality	Number of items	Construct measured	Dimensions/domains
Ammondson (2009)	Religious Experience Scale (RES)	25	Religiosity; religious/spiritual experience	Three domains: Religious experience immanent; Religious experience social; Religious experience mystical
Ammondson (2009)	Adult self-transcendence inventory (ASTI)	34	Spirituality; self-transcendence as the developmental culmination of wisdom	Two domains: Self-transcendence; Alienation
Bartlett et al. (2003)	Spiritual Transcendence Scale (STS)	24	Spirituality as a way to express the need for transcendence; spiritual transcendence as the capacity to stand outside one's immediate sense of time and place to view life from a larger and more objective perspective	Three domains: Connectedness (sense of community and relationship with others) Prayer fulfillment (traditional religion or spirituality); Universality (meaning and purpose of life)
Büssing and Koenig (2008)	BENEFIT	6	Spirituality; beneficial effects of spirituality involvement on patient's life concerns	One domain
Büssing et al. (2009)	Spiritual and Religious Attitudes in Dealing with Illness (SpREUK) version short-form 24	24	Spiritual attitudes and convictions; patient's interest in spiritual concerns	Four domains: Search for meaningful support (spiritual quest orientation); Trust in higher source (intrinsic religiosity); Positive interpretation of disease (interpret illness as an opportunity, a hint to change and to reflect about what is important in life); Life through spirituality/religiosity (beneficial effects of spirituality/religiosity)
Cooper-Effa et al. (2001)	Spiritual Well-being Scale (SWBS)	20	Sense of well-being in relation to God; Sense of life-purpose and life-satisfaction	Two domains: Religious well-being; Existential well-being

Table 2 (continued)

Author (year)	Measures of religiosity/spirituality	Number of items	Construct measured	Dimensions/domains
Dezutter et al. (2009)	Post-critical Belief Scale (PCBS)	33	Religiosity; attitudes towards religion	Four domains: Literal inclusion (belief in transcendence; literal and dogmatic interpretation of religion); Literal exclusion (rejection of transcendence; literal and dogmatic interpretation of religion); Symbolic inclusion (belief in transcendence; literal and symbolic interpretation of religion); Symbolic exclusion (rejection of transcendence; literal and symbolic interpretation of religion)
Dezutter et al. (2010)	Centrality of Religious Meaning System Scale (CRMSS)	13	Religiosity; centrality of a religious meaning system; integration of a religious meaning system within the personality structure of a person	One domain
Dezutter et al. (2011)	Frequency of prayer	1	Religiosity; frequency of prayer	One domain
Dunn (2005)	JAREL Spiritual Well-being Scale	21	Spirituality; spiritual well-being	Three domains: Faith/belief (purpose in life, relationship between spiritual beliefs and life style, belief in a Supreme Being); Life/self-responsibility (lack of a belief in a Supreme Power, difficulty in forgiving); Life satisfaction/self-actualization (acceptance of life situations, ability to have loving relationships)
Gomes et al. (2018)	Pinto and Pais-Ribeiro Spirituality Scale	5	Spirituality; meaning of life and construction of hope and a positive perspective of life	Two domains: Beliefs (vertical dimension of spirituality; meaning/significance of life); Hope/optimism (construction of hope and a positive perspective of life)
Harris et al. (2017)	Religious and Spiritual Struggles (RSSS)	26	Spirituality; spiritual distress	One domain

Table 2 (continued)

Author (year)	Measures of religiosity/spirituality	Number of items	Construct measured	Dimensions/domains
Harrison et al. (2005)	Duke Religiosity Index (DRI)	5	Religiosity; religious involvement	Three domains: Public-organizational religiosity (church attendance); Private-nonorganizational religiosity (prayer/bible study); Intrinsic religiosity
Keefe et al. (2001)	Brief Multidimensional Measure of Religiousness/Spirituality—Daily Spiritual Experience Scale (BMMRS DSES)	6	Spirituality; perception of the transcendent (God or higher power) in daily life and perception of the involvement of the transcendent in life	One domain
Lavin and Park (2011)	SWBS Existential Well-being subscale (SWBS EWB)	*cf*. measure's description for Cooper-Effa et al. (2001)		
McParland and Knussen (2010)	Dichotomous: (does not) hold religious belief	1	Religiosity	One domain
Meier (1982)	Meier Religious Commitment Scale (MRCS)	15	Religiosity	Two domains: Ritual and rational (ritualistic and rational religious mode of expression); Emotional and experiential (emotional-familial religious mode of expression)
Nsamenang et al. (2016)	Functional Assessment of Chronic Illness Therapy (FACIT-SP)	12	Overall spiritual well-being	Two domains: Meaning/peace; Faith

Table 2 (continued)

Author (year)	Measures of religiosity/spirituality	Number of items	Construct measured	Dimensions/domains
Rippentrop et al. (2005)	Brief Multidimensional Measure of Religiousness/Spirituality (BMMRS)	38	Religiosity and spirituality	Eleven domains: Daily spiritual experiences (perception of the transcendence in daily life and of the involvement of the transcendent in life); Values/beliefs (belief in a Higher Power, sense of responsibility for reducing pain and suffering in the world); Forgiveness (of self, others and forgiveness by Higher Power); Private religious practices (e.g. prayer, meditation, reading religious material); Religious and spiritual coping (positive/negative coping; seeing the Higher Power as benevolent/supportive or punishing/abandoning); Religious support (benefits/problems of the social relationships in the sharing of the worship place); Religious/spiritual history (history of life changing religious/spiritual experiences); Commitment (to religious/spiritual beliefs); Organizational religiousness (engagement with a formal public religious institution); Religious preference; Overall self-ranking (how religious/spiritual a person consider her/himself)
Ruzicka et al. (2007)	SWBS	*cf*. measure's description for Cooper-Effa et al. (2001)		
Rzeszutek et al. (2017)	Self-Description Questionnaire	20	Spirituality	Three domains: Religiosity (level of religious practice); Ethical sensitivity (level of ethical attitude); Harmony (feeling of internal peace and happiness)

Ammondson 2009; Bartlett et al. 2003; Gomes et al. 2018; Keefe et al. 2001; Rippentrop et al. 2005; Rzeszutek et al. 2017), spiritual and religious attitudes or attitudes toward religion (Büssing et al. 2009; Dezutter et al. 2009), religions and/or spiritual well-being (Cooper-Effa et al. 2001; Dunn 2005; Lavin and Park 2011; Nsamenang et al. 2016; Ruzicka et al. 2007; Rzeszutek et al. 2017), beneficial effects of spiritual/religious involvement (Büssing and Koenig 2008; Büssing et al. 2009), and spiritual distress (Harris et al. 2017).

Measures of Pain Intensity, Pain Interference, Disability, and Physical Function Used

A summary of the measures of pain, disability and physical function used in the included studies may be found in Table 3. Measures for each of these criterion variables varied, and evaluated a variety of domains. Measures of pain intensity used in these studies were either single-item ratings of pain intensity (e.g., the Visual Analogue Scale; Harrison et al. 2005; Ruzicka et al. 2007) or a number of different scales assessing current pain intensity or recall ratings of average, worst, and/or least pain intensity during variable recall periods ranging from 7 days to 1 month (Ammondson 2009; Dezutter et al. 2010, 2011; Dunn 2005). In studies using multiple-items pain rating scales, pain intensity was rated either using a Numerical Rating Scale or a Verbal Rating Scale, and a composite score of pain intensity was computed. Four studies used the composite scores of pain intensity scales from other commonly used multiple-item measures (Cooper-Effa et al. 2001; Keefe et al. 2001; Lavin and Park 2011; McParland and Knussen 2010), for example, the West Haven-Yale Multidimensional Pain Inventory (WHYMPI; Kerns, Turk, and Rudy 1985).

Measures of pain interference or disability used scales with 2 (Harris et al. 2017) to 9 items (Rippentrop et al. 2005). In the six studies assessing pain interference, this domain was assessed by a subscale of a variety of different commonly used measures of physical function and pain (Cooper-Effa et al. 2001; Harris et al. 2017; McParland and Knussen 2010; Nsamenang et al. 2016; Rippentrop et al. 2005). The only measure of pain interference that was used in more than one study was the Interference scale of the WHYMPI (Cooper-Effa et al. 2001; Rippentrop et al. 2005). Only one study measured two domains of pain-related disability, using two different measures: the scale of Body Care and Movement of the Sickness Impact Profile, to assess the impact of illness on physical the ability to move and perform activities of daily living (Ruzicka et al. 2007).

Studies measuring physical function used one of three different multiple-scale measures of health-related quality of life or of functional status as autonomy or ability to perform daily activities (Bartlett et al. 2003; Lavin and Park 2011; Rippentrop et al. 2005). The only measure of (better) physical function that was used in more than one study was the Medical Outcome Study 36-item Short Form Health Survey (SF-36; Bartlett et al. 2003; Rippentrop et al. 2005). Domains of physical function assessed included: (1) physical functioning (Bartlett et al. 2003); (2) physical role functioning (Bartlett et al. 2003); (3) pain (Bartlett et al. 2003); (4) general health (Bartlett et al. 2003); (5) global physical health perception (Rippentrop et al. 2005); and (6) autonomy or ability to perform daily activities (Lavin and Park 2011).

Table 3 Measures of function, pain-related beliefs, coping responses, and catastrophizing used in the included studies

Author (year)	Measures of function	Number of items	Construct(s) measured	Dimensions/domains
Ammondson (2009)	Participant Subjective Pain Rating Scale [lowest, highest and most common pain intensity during the previous week, rated in a 0–10 numerical rating scale (0–10 NRS)]	3	Pain intensity	One domain
Ammondson (2009)	Brief Symptom Inventory—version of 18 items (BSI-18)	18	Psychological function; psychological distress and psychiatric symptoms	Four domains: Depression; Anxiety; Somatization; Overall psychological distress
Bartlett et al. (2003)	Medical Outcomes Study 36-item Short Form Health Survey (SF-36)	36	Physical/psychological function; physical and mental health perception; generic health-related quality of life	Eight domains grouped in 2 summary components: Physical Component Summary (PCS) Physical functioning; Physical role functioning; Pain; General health; Mental Component Summary (MCS) Emotional role functioning; Mental health; Social role functioning; Vitality
Bartlett et al. (2003)	Affect Balance Scale (ABS)		Psychological function; general psychological well-being or happiness	Two domains: Positive affect; Negative affect
Bartlett et al. (2003)	Center for Epidemiological Studies—Depression (CES-D-10), 10 items version	10	Psychological function; depression.	One domain

Table 3 (continued)

Author (year)	Measures of function	Number of items	Construct(s) measured	Dimensions/domains
Basinski et al. (2013)	Visual Analogue Scale (VAS)	1	Pain intensity	One domain
Büssing and Koenig (2008)	Adaptive Disease Coping Questionnaire (AKU)—25-item version	25	Not-pain specific coping responses; active and adaptive coping styles in terms of locus of disease control	Five domains: Trust in God's help; Conscious living and positive attitudes; Trust in medical help; Reappraisal of illness as chance; Escape from illness
Büssing et al. (2009)	AKU	45	Not-pain specific coping responses; active and adaptive coping styles in terms of locus of disease control	Seven domains: Trust in God's help; Conscious and healthy way of living; Positive attitudes; Trust in medical help; Reappraisal of illness as chance; Search for alternative help; Escape from illness
Cooper-Effa et al. (2001)	West Haven-Yale Multidimensional Pain Inventory (WHYMPI)	52	Pain intensity and pain interference	Three domains: Pain intensity; Pain interference; Life control
Dezutter et al. (2009)	Composite score obtained from the mean of the Satisfaction with Life Scale (SWLS) and the short version of the Oxford Happiness Questionnaire (OHQ) scores	13	Psychological function; subjective well-being	One domain

Table 3 (continued)

Author (year)	Measures of function	Number of items	Construct(s) measured	Dimensions/domains
Dezutter et al. (2010)	0–10 NRS (current pain, and lowest and highest pain intensity during the previous week, rated in a 0–10 numerical rating scale)	3	Pain intensity	One domain
Dezutter et al. (2011)	0–10 NRS (current pain, and lowest and highest pain intensity during the previous week, rated in a 0–10 numerical rating scale)	3	Pain intensity	One domain
Dezutter et al. (2011)	Coping Orientation to Problems Experienced Inventory (COPE) Positive Reinterpretation and Growth Scale	4	Not-pain specific coping responses; cognitive positive re-appraisal	One domain
Dunn (2005)	Verbal Descriptor Scale (VDS; average, least and worse pain intensity during the previous week, rated in a 0–5 verbal rating scale)	3	Pain intensity	One domain
Dunn (2005)	Behavioral and cognitive coping	16	Not-pain specific coping responses; behavioral and cognitive non-religious coping responses derived from the Coping Strategies Questionnaire and from the Agency for Health Care Policy and Research guidelines	Two domains (a total non-religious coping score was computed): Behavioral coping; Cognitive coping

Table 3 (continued)

Author (year)	Measures of function	Number of items	Construct(s) measured	Dimensions/domains
Dunn (2005)	Short Form Religious Problem-Solving Scale (RPS)	18	Not-pain specific coping responses; religious coping responses	Three domains (a total religious coping score was computed): Collaborative style (the person and God share the responsibility for coping); Self-directive style (the person has the responsibility for coping); Deferring style (God has the responsibility for coping)
Gomes et al. (2018)	28-Items Survey of Pain Attitudes (SOPA-28)	28	Pain-related beliefs	Seven domains: Medical cure (belief in a medical cure for pain); Pain control (belief in one's control over pain); Solicitude (belief that others should be solicitous in response to pain); Disability (belief that one is disabled by pain); Medication (belief that medications are appropriate for pain management); Emotion (belief that emotions influence pain); Harm (belief that pain is a signal of harm, and that therefore activity should be avoided)

Table 3 (continued)

Author (year)	Measures of function	Number of items	Construct(s) measured	Dimensions/domains
Harris et al. (2017)	Patient-Report Outcomes Measurement Information System–Pain Interference Scale (PROMIS PIS)	2	Pain interference; extent to which pain modifies behavioral and emotional functioning.	One domain
Harris et al. (2017)	Pain Catastrophizing Scale	13	Catastrophizing	Three domains: Rumination; Magnification; Helplessness
Harris et al. (2017)	Patient Health Questionnaire depression scale (PHQ-8)	8	Psychological function; depression	One domain
Harrison et al. (2005)	Visual Analogue Scale (VAS)	1	Pain intensity	One domain
Harrison et al. (2005)	Symptom Check List-90 (SCL-90)	90	Psychological function; psychological distress and psychiatric symptoms	Five domains were considered in this study: Somatization; Interpersonal sensitivity; Hostility; Depression; Anxiety
Keefe et al. (2001)	Rapid Assessment of Disease Activity in Rheumatology (RADAR) pain intensity items (pain intensity ratings for 12 single joints and 8 joint groups, rated in a 0–4 verbal rating scale)	20	Pain intensity; daily joint pain intensity.	One domain

Table 3 (continued)

Author (year)	Measures of function	Number of items	Construct(s) measured	Dimensions/domains
Keefe et al. (2001)	18 Items of the Profile of Mood States (POMS)	18	Psychological function; daily mood states	Two domains: Positive affect (elation, composure, and agreeableness); Negative affect (depression, anxiety, and hostility)
Keefe et al. (2001)	Brief Multidimensional Measure of Religiousness/Spirituality (BMMRS)—Religious/Spiritual Coping Scale	7	Not-pain specific coping responses; daily religious/spiritual coping responses derived from the RCOPE	Three domains: Positive religious/spiritual coping; Negative religious/spiritual coping; Salience of religion for coping
Lavin and Park (2011)	Brief Pain Inventory (BPI)	15	Pain intensity and pain interference	Two domains: Pain intensity; Pain interference
Lavin and Park (2011)	Older American Resources and Services Activities of Daily Living (OARS ADL)	14	Physical function; functional status as autonomy or ability to perform a series of daily activities	Two domains: Instrumental activity of daily living (e.g., use of telephone, travel, shopping, meal preparation, housework); Physical activities of daily living (ability to perform physical activities of daily living, as eating, dressing and undressing, grooming, walking, showering)
Lavin and Park (2011)	CES-D-10	*cf.* measure's description for Bartlett et al. (2003)		

Table 3 (continued)

Author (year)	Measures of function	Number of items	Construct(s) measured	Dimensions/domains
McParland and Knussen (2010)	Chronic Pain Grade (CPG)	6	Pain intensity (current, average, and worst pain intensity, rated in a 0–10 NRS) and pain interference	Two domains: Pain intensity; Pain interference (interference in daily, social and work activities)
McParland and Knussen (2010)	28-Item General Health Questionnaire (GHQ-28)	28	Psychological function; psychological distress	Four domains: Somatic symptoms; Anxiety and insomnia; Social dysfunction; Depression
Meier (1982)	Beck Depression Inventory (BDI)	21	Psychological function; depression	One domain
Nsamenang et al. (2016)	Multiple Sclerosis Quality of Life Inventory (MSQLI)—Pain Effects Scale	6	Pain interference; the effect of pain on behavior and mood	One domain
Nsamenang et al. (2016)	Centers for Epidemiological Studies—Depression (CES-D-20), 20 items version	20	Psychological function; depression	One domain
Rippentrop et al. (2005)	Multidimensional Pain Inventory (MPI)—Interference Scale	9	Pain interference	One domain
Rippentrop et al. (2005)	SF-36	*cf.* measure's description for Bartlett et al. (2003)	2 Domains: Physical Component Summary (PCS); Mental Component Summary (MCS)	
Ruzicka et al. (2007)	VAS	*cf.* measure's description for Basinski et al. (2013a)		

Table 3 (continued)

Author (year)	Measures of function	Number of items	Construct(s) measured	Dimensions/domains
Ruzicka et al. (2007)	Sickness Impact Profile (SIP)	136 (complete SIP)	Physical/Psychological function; impact of disease on physical and emotional functioning	Three domains were considered in this study: Body Care and Movement (SIP-BCM; ability to move and perform activities of daily living); Emotional Behavior (SIP-EB; behaviors of anxiety, nervousness, irritability, and emotional state); Social Interaction (SIP-SI; social interaction with family and friends)
Ruzicka et al. (2007)	Pain Beliefs Questionnaire (PBQ)	12	Pain-related beliefs	Two domains: Organic (organic aspects and implications of pain); Psychologic (psychologic aspects and implications of pain)
Rzeszutek et al. (2017)	Post-traumatic Growth Inventory (PTGI)	21	Psychological function; post-traumatic growth as positive outcomes reported by people who have experienced traumatic events	Five domains: Relating to others; New possibilities; Personal strength; Spiritual change; Appreciation of life

Measures of Depressive Symptoms, Anxiety Symptoms, and Psychological Function Used

As can be seen in Table 3, a number of different instruments were used to measure depressive symptoms, anxiety symptoms and other domains of (worse and better) psychological function. Measures of these domains ranged from a 8-item instrument measuring depression (Harris et al. 2017), to a 90-item scale measuring a variety of psychiatric symptoms and psychological distress (Harrison et al. 2005). Ten studies measured either depressive symptoms, anxiety symptoms and/or other domains of worse psychological function. Domains assessed in these studies included: (1) depressive symptoms (Ammondson 2009; Bartlett et al. 2003; Harris et al. 2017; Lavin and Park 2011; Meier 1982; Nsamenang et al. 2016); (2) anxiety symptoms (Ammondson 2009; Harrison et al. 2005); (3) somatization (Harrison et al. 2005); (4) interpersonal sensitivity (Harrison et al. 2005); (5) hospitality (Harrison et al. 2005); (6) psychological distress (McParland and Knussen 2010); (7) negative impact of disease in emotional behavior (Ruzicka et al. 2007), and (8) negative affect (Bartlett et al. 2003; Keefe et al. 2001).

Finally, six studies measured better psychological function. A third of these studies used measures health-related quality of life ($n=2$ [10%]; Rippentrop et al. 2005). The domains considered included: (1) emotional role functioning (Bartlett et al. 2003); (2) mental health (Bartlett et al. 2003); (3) social role functioning (Bartlett et al. 2003); (4) vitality (Bartlett et al. 2003); and (5) global mental health perception (Rippentrop et al. 2005). The remaining studies assessed either well-being or happiness ($n=1$ [5%]; Dezutter et al. 2009), posttraumatic growth ($n=1$ [5%]; Rzeszutek et al. 2017) or positive affect ($n=2$ [10%]; Bartlett et al. 2003; Keefe et al. 2001).

Measures of Pain-Related Beliefs, Coping Responses and Catastrophizing Used

Instruments used in the eight studies assessing either pain-related beliefs, coping responses, or catastrophizing measured a variety of different domains (*cf.* Table 3). The two studies evaluating pain-related beliefs (Gomes et al. 2018; Ruzicka et al. 2007) used either the Survey of Pain Attitudes (SOPA) or the Pain Belief Questionnaire (PBQ), to assess a number of different beliefs related to the organic or psychological etiology and aspects of pain, pain-related disability, personal control over pain, medical cure for pain, among others.

As for studies assessing coping responses, corresponding measures used scales with as few as 4 items (assessing the cognitive positive reappraisal of problems; (Dezutter et al. 2011) to as many as 45 items (assessing active and adaptive coping responses in terms of locus of disease control (Büssing et al. 2009). All of these studies ($n=5$ [21%]) used general (i.e., not necessarily pain-specific) coping measures (Büssing and Koenig 2008; Büssing et al. 2009; Dezutter et al. 2011; Dunn 2005; Keefe et al. 2001). The coping measures used included: (1) both the 25- and 45-item version of the Adaptive Disease Coping Questionnaire (AKU-25 and AKU-45; (Büssing and Koenig 2008; Büssing et al. 2009); (2) the Positive Reinterpretation and Growth Scale of the Coping Orientation to Problems Experienced Inventory (COPE; Dezutter et al. 2011); (3) a behavioral and cognitive coping measure

developed by the authors of the study (Dunn 2005); (4) the Short Form Religious Problem-Solving Scale (RPS; Dunn 2005); and (5) the Religious/Spiritual Coping Scale of the Brief Multidimensional Measure of Religiousness/Spirituality (BMMRS; Keefe et al. 2001).

Only one study evaluated pain catastrophizing (Harris et al. 2017). In this study, the authors used the Pain Catastrophizing Scale to assess three catastrophizing domains: (1) rumination; (2) magnification; and (3) helplessness.

Study Quality Assessment

Table 4 summarizes the methodological quality assessment of the included studies. As can be seen, the quality scores of the included studies ranged from 29% (low) to 86% (high). Only three (15%) studies scored high in the methodological quality (Harrison et al. 2005; Lavin and Park 2011; Rippentrop et al. 2005), while 11 (55%) were rated as moderate quality (Ammondson 2009; Bartlett et al. 2003; Büssing et al. 2009; Cooper-Effa et al. 2001; Dezutter et al. 2009, 2010; Dunn 2005; Harris et al. 2017; McParland and Knussen 2010; Meier 1982; Ruzicka et al. 2007). Five (25%) studies were classified as having low methodological quality (Büssing and Koenig 2008; Dezutter et al. 2011; Gomes et al. 2018; Nsamenang et al. 2016; Rzeszutek et al. 2017).

With respect to the representativeness of the studies' samples and generalizability of findings, 10 (50%) studies included either representative cases or consecutive sampling (Büssing and Koenig 2008; Büssing et al. 2009; Cooper-Effa et al. 2001; Dezutter et al. 2009, 2010; Harris et al. 2017; Harrison et al. 2005; Lavin and Park 2011; McParland and Knussen 2010; Meier 1982). In six eight (30%) studies (Ammondson 2009; Dezutter et al. 2011; Dunn 2005; Lavin and Park 2011; Rippentrop et al. 2005; Ruzicka et al. 2007) the authors clearly made the diagnosis of chronic pain in the sample based on a pain duration of at least 3 months. With respect to internal validity the one study assessing function, pain-related beliefs, coping responses or catastrophizing in at least one religious group independently (Dezutter et al. 2011) did not controlled for potential confounding variables (assessment of confounders). In contrast, all included studies performed a power analysis a priori to determine the sample size that would be needed to obtain reliable estimates, or have a sample size of at least 30 participants (per group; statistical methods). Eleven (55%) studies reported the flow of participants (Ammondson 2009; Bartlett et al. 2003; Cooper-Effa et al. 2001; Dezutter et al. 2009, 2010; Gomes et al. 2018; Harris et al. 2017; Harrison et al. 2005; Lavin and Park 2011; McParland and Knussen 2010; Rippentrop et al. 2005), but only three (25%; (Büssing et al. 2009; Harrison et al. 2005; Rippentrop et al. 2005) appropriately reported and employed adequate methods for dealing with missing values. Only two (10%) studies did not use a religiosity/spirituality or outcome measures with demonstrated validity and/or reliability for the study population (Büssing and Koenig 2008; Gomes et al. 2018).

Table 4 Methodological quality of included studies

Author (year)	1. Representativeness	2. Baseline characteristics	3. Diagnosis of chronic pain	4. Power	5. Confounding variables	6. Reporting flow of participants	7. Dealing with missing data	8. Validity of measurement tools	9. Evidence of reliability of measurement tools	Total score (%)
Ammondson (2009)	0	–	1	1	–	1	0	1	1	71
Bartlett et al. (2003)	0	–	?	1	–	1	0	1	1	57
Büssing and Koenig (2008)	1	–	?	1	–	0	0	?	1	43
Büssing et al. (2009)	1	–	?	1	–	0	1	1	1	71
Cooper-Effa et al. (2001)	1	–	?	1	–	1	0	1	1	71
Dezutter et al. (2009)	1	–	?	1	–	1	0	1	1	71
Dezutter et al. (2010)	1	–	?	1	–	1	0	1	1	71
Dezutter et al. (2011)	?	0	1	1	0	0	0	1	1	44
Dunn (2005)	0	–	1	1	–	0	0	1	1	57
Gomes et al. (2018)	0	–	?	1	–	1	0	1	0	43
Harris et al. (2017)	1	–	?	1	–	1	0	1	1	71
Harrison et al. (2005)	1	–	?	1	–	1	1	1	1	86
Keefe et al. (2001)	0	–	?	1	–	0	0	1	1	29

Table 4 (continued)

Author (year)	1. Representativeness	2. Baseline characteristics	3. Diagnosis of chronic pain	4. Power	5. Confounding variables	6. Reporting flow of participants	7. Dealing with missing data	8. Validity of measurement tools	9. Evidence of reliability of measurement tools	Total score (%)
Lavin and Park (2011)	1	–	1	1	–	1	0	1	1	86
McParland and Knussen (2010)	1	–	?	1	–	1	0	1	1	71
Meier (1982)	1	–	?	1	–	0	0	1	1	57
Nsamenang et al. (2016)	0	–	?	1	–	0	0	1	1	43
Rippentrop et al. (2005)	?	–	1	1	–	1	1	1	1	86
Ruzicka et al. (2007)	0	–	1	1	–	0	0	1	1	57
Rzeszutek et al. (2017)	0	–	?	1	–	0	0	1	1	43

0—No; 1—Yes; ?—Unclear. 1. Representativeness: are the cases consecutive? Or was the sample truly randomly selected from the population of interest?; 2. Baseline characteristics: are the baseline characteristics of the groups (diagnosis, age, and sex) similar? (only in the event of comparison between different religious groups); 3. Diagnosis of chronic pain: Were participants with pain for 3 months or longer included?; 4. Power: Was there a priori method for sample size calculation? OR Was the sample size for each group 30 or more?; 5. Confounding variables: Were the confounding variables controlled for? (only in the event of comparison between different religious groups); 6. Reporting flow of participants: Was the flow of participant reported?; 7. Dealing with missing data: Were methods for dealing with missing data described and appropriate?; 8. Validity of measurement tools: Were valid measures used for assessment of religiosity/spirituality, pain, physical function/disability, depression, anxiety, psychological function, pain beliefs, coping, and or catastrophizing (accepted cultural adaptation processes adapted)?; 9. Evidence of reliability of measurement tools: Was evidence presented supporting the reliability of the measure of religiosity/spirituality, pain, physical function/disability, depression, anxiety, psychological function, pain beliefs, coping, and or catastrophizing (i.e., internal consistency of >0.60 in the current sample or clear evidence of its reliability in the population of interest in a previous study)?

Associations Between Religiosity/Spirituality and Function

The association between religiosity/spirituality and function also seemed to vary as a function of the domain of religiosity/spirituality and of function assessed. Table 5 details findings from the included studies.

Associations with Pain Intensity

Eight studies assessed the association between religiosity/spirituality and pain intensity (Cooper-Effa et al. 2001; Dezutter et al. 2010, 2011; Dunn 2005; Harrison et al. 2005; Lavin and Park 2011; McParland and Knussen 2010; Ruzicka et al. 2007). The main trend for these studies was of nonsignificant associations between pain intensity and various domains of religiosity (Dezutter et al. 2010, 2011; McParland and Knussen 2010) and spiritual and/or religious well-being (Cooper-Effa et al. 2001; Ruzicka et al. 2007). Two studies found a statistically significant but negative weak association between pain intensity and spiritual well-being (Dunn 2005; Lavin and Park 2011). Mixed results were found by Harrison and colleagues (Harrison et al. 2005), with pain intensity showing a significant negative association with church attendance and prayer/bible study, but no significant association with intrinsic religiosity.

Associations with Pain Interference/Disability

The predominant trend for the six studies reporting the association between religiosity/spirituality and either pain interference or disability (Cooper-Effa et al. 2001; Harris et al. 2017; McParland and Knussen 2010; Nsamenang et al. 2016; Rippentrop et al. 2005; Ruzicka et al. 2007) was either of no significant association between these variables and religious well-being (Cooper-Effa et al. 2001) and religiosity (McParland and Knussen 2010) or of mixed results (Nsamenang et al. 2016; Rippentrop et al. 2005). In the studies that showed mixed results, pain interference showed negative weak associations with forgiveness (Rippentrop et al. 2005) and negative moderate associations with meaning/peace and spiritual well-being (Nsamenang et al. 2016), but no significant association with the remaining (and most part of the) dimensions of religiosity/spirituality considered (Nsamenang et al. 2016; Rippentrop et al. 2005). The remaining two studies reported either a negative weak association between disability and spiritual well-being (Ruzicka et al. 2007), and a positive moderate association between pain interference and religious and spiritual struggles (Harris et al. 2017).

Associations with Better Physical Function

Associations between physical function and religiosity/spirituality were estimated in three studies (Bartlett et al. 2003; Lavin and Park 2011; Rippentrop et al. 2005). Lavin and Park (2011) found no significant association between physical function and spiritual well-being. Findings were mixed for the remaining two studies. Bartlett et al. (2003) found a positive weak association between spirituality and SF-36

Table 5 Summary of the findings: association between religiosity/spirituality and pain, physical function/disability, depression, anxiety and/or psychological function

Author (year)	Statistical analysis of interest	Association between religiosity/spirituality and pain and physical function/disability	Association between religiosity/spirituality and depression/anxiety and psychological function
Ammondson (2009)	Correlation	N/A	BSI total score, depression and anxiety and religiosity: $-.24, ns < r < -.08, ns$; BSI total score, depression and anxiety and spirituality: $-.55, p < .001 < r < -.40, p < .0$
Bartlett et al. (2003)	Correlation	SF-36 general health and spirituality: $r = .29, p < .01$; SF-36 other scales and spirituality: unknown, *ns*	SF-36 other scales and spirituality: unknown, *ns*; ABS positive affect and spirituality: $r = .26, p < .05$; ABS negative affect and spirituality: .04, *ns*; ABS affect balance and spirituality: .13, *ns*; CES-D and spirituality: $r = -.04$, *ns*
Cooper-Effa et al. (2001)	Regression	WHYMPI pain intensity and existential well-being: *Adjusted* $R^2 = .13, p < .05$ ($b = -.02, t = -1.20$, *ns*); WHYMPI pain intensity and religious well-being: *Adjusted* $R^2 = .13, p < .05$ ($b = -03, t = -1.07$, *ns*); WHYMPI pain interference and existential well-being: *Adjusted* $R^2 = .06$, *ns* ($b = -.03, t = -1.33$, ns); WHYMPI pain interference and religious well-being: *Adjusted* $R^2 = .04$, *ns* ($b = -.00, t = -.12$, *ns*)	N/A
Dezutter et al. (2009)	Correlation	N/A	SWLS and OHQ composite score and literal inclusion/exclusion: $-.17, p < .05 < r < -.02$, *ns*; SWLS and OHQ composite score and symbolic exclusion/inclusion: $.18, p < .05 < r < .20, p < .05$
Dezutter et al. (2010)	Correlation	0–10 NRS pain intensity and Religiosity: $r = -.08$, *ns*	N/A
Dezutter et al. (2011)	Correlation	0–10 NRS pain intensity and prayer: $r = -.01$, *ns*	N/A
Dunn (2005)	Structural equation modeling	VDS pain intensity and spiritual well-being: $b = -.16, p < .05$	N/A
Harris et al. (2017)	Correlation	PROMIS PIS and religious and spiritual struggles: $r = .33, p < .001$	PHQ-8 and religious and spiritual struggles $r = .56$, $p < .001$

Table 5 (continued)

Author (year)	Statistical analysis of interest	Association between religiosity/spirituality and pain and physical function/disability	Association between religiosity/spirituality and depression/anxiety and psychological function
Harrison et al. (2005)	Independent samples *t* test Regression	VAS pain intensity and Church attendance (at least/less than once a week): $t=-4$, $p<0001$; VAS pain intensity and prayer/Bible study (at least/less than once a day): $t=-.71$, *ns* VAS pain intensity and intrinsic religiosity (median split: high/low): $t=-.27$, *ns* Regression analysis (vd: VAS; vi: church attendance): *Adjusted* $R^2=.34$; Estimate = 9.49, SE = 2.27, $p<.001$	SCL-90 and Church attendance: Somatization (S): $t=-2.45$, $p<.05$; Interpersonal Sen.(IS): $t=-2.5$, $p<.05$; Depression (D): $t=-2.35$, $p<.05$; Anxiety (A): $t=-2.92$, $p<.01$; Hostility (H): $t=-.24$, *ns* SCL-90 and Prayer/Bible study: S: $t=-.87$, *ns*; IS: $t=-1.22$, *ns*; D: $t=-.55$, *ns*; A: $t=-.93$, $p<.05$; H: $t=-.29$, *ns* SCL-90 and intrinsic religiosity: S: $t=1.19$, *ns*; IS: $t=1.80$, *ns*; D: $t=.56$, *ns*; A: $t=1.88$, *ns*; H: $t=.71$, *ns*
Keefe et al. (2001)	Standardized maximum likelihood estimates for within-Pearson relations	N/A	POMS positive mood and spirituality: $b=.41$, $t=6.15$, $p<.01$; POMS negative mood and spirituality: $b=-.34$, $t=-3.42$, $p<0.01$
Lavin and Park (2011)	Correlation	BPI pain intensity and spiritual well-being: $r=-.23$, $p<.01$. OARS ADL and spiritual well-being: $r=-.15$, *ns*	CES-D and spiritual well-being: $r=-.42$, $p<.01$
McParland and Knussen (2010)	Correlation	CPG pain intensity and religiosity: $r_{pb}=.07$, *ns*; CPG pain interference and religiosity: $r_{pb}=.07$, *ns*	GHQ-28 and religiosity: $r_{pb}=-.02$, *ns*
Meier (1982)	Mean (standard deviation) Regression	N/A	Regression analysis: (vd: BDI, vi: religious "emotional-familial"): $b=-.63$, $p<.001$

Table 5 (continued)

Author (year)	Statistical analysis of interest	Association between religiosity/spirituality and pain and physical function/disability	Association between religiosity/spirituality and depression/anxiety and psychological function
Nsamenang et al. (2016)	Correlation	MSQOLI pain effect and spiritual well-being (total score): $r=-.36$, $p<.01$; MSQOLI pain effect and spirituality (meaning and peace): $r=-.42$, $p<.01$; MSQOLI pain effect and spirituality (faith): $r=-.13$, *ns*	CES-D-20 and spiritual well-being (total score): $r=-.52$, $p<.01$; CES-D-20 and spirituality (meaning and peace): $r=-.60$, $p<.01$; CES-D-20 and spirituality (faith): $r=-.21$, *ns*
Rippentrop et al. (2005)	Correlation	MPI pain interference and religiosity/spirituality: Daily spiritual experiences (DSE): $r=-.05$, *ns*; Values/beliefs (V/B): $r=.02$, *ns*; Forgiveness (FG): $r=-.24$, $p<.01$; Private religious practices (PRP): $r=.08$, *ns*; Religious support (SUP): $r=.01$, *ns*; Organizational religiousness (OR): $r=-.02$, *ns*; Self-ranked religious and spiritual intensity (SRI): $r=-.03$, *ns* SF-36 PCS: DSE: $r=-.13$, *ns*; V/B: $r=-.16$, *ns*; FG: $r=-.04$, *ns*; PRP: $r=-.28$, $p<0{,}05$; SUP: $r=-.16$, *ns*; OR: $r=-.16$, *ns*; SRI: $r=-.16$, *ns*	SF-36 MCS and religiosity/spirituality: DSE: $r=.27$, $p<.01$; V/B: $r=.16$, *ns*; FG: $r=.47$, $p<.001$; PRP: $r=.17$, *ns*; SUP: $r=.24$, $p<.05$; OR: $r=.16$, *ns*; SRI: $r=.26$, $p<.01$
Ruzicka et al. (2007)	Correlation	VAS pain intensity and spiritual well-being: $r=-.02$, *ns*; SIP-BCM and spiritual well-being: $r=-.18$, $p<.05$	SIP-EB and spiritual well-being: $r=-.05$, *ns*
Rzeszutek et al. (2017)	Correlation	N/A	PTGI and spirituality: $r=.34$, $p<.01$

ABS, Affect Balance Scale; BDI, beck depression inventory; BPI, brief pain inventory; BSI, brief symptoms inventory; CES-D, center for epidemiological studies-depression; COPE, coping orientation to problems experienced inventory; CPG, 7-item chronic pain grade; GHQ-28, 28-item General Health Questionnaire; MPI, multidimensional pain inventory; NRS, Numerical Rating Scale; OHQ, Short version of the Oxford Happiness Questionnaire; PHQ-8, Patient Health Questionnaire; POMS, profile of mood states; PROMIS PIS, PROMIS Pain Interference Scale; PTGI, post-traumatic growth inventory; SCL-90, symptoms check list-90; SF-36/SF-12, medical outcomes study short form 36/medical outcomes study short form 12; SF-36/SF-12 PCS, SF-36/SF-12 physical component summary; SF-36/SF-12 MCS, SF-36/SF-12 mental component summary; SIP-BCM, sickness impact profile-body care and movement; SIP-EB, SIP-emotional behavior; SIP-SI, SIP-social interaction; SWLS, Satisfaction with Life Scale; VAS, Visual Analogue Scale; VDS, Verbal Descriptor Scale pain Intensity Index

General Health, while Rippentrop et al. (2005) found a negative weak association between the SF-36 Physical Component Summary and private religious practices. However, there was no significant association between the remaining SF-36 dimensions of physical function and spirituality (Bartlett et al. 2003), or between SF-36 Physical Component Summary score and the remaining domains of religiosity/spirituality considered (Rippentrop et al. 2005).

Associations with Depressive Symptoms, Anxiety Symptoms, and/or Worse Psychological Function

Ten studies evaluated the associations between depressive or anxiety symptoms or other measure of worse psychological function and religiosity/spirituality (Ammondson 2009; Bartlett et al. 2003; Harris et al. 2017; Harrison et al. 2005; Keefe et al. 2001; Lavin and Park 2011; McParland and Knussen 2010; Meier 1982; Nsamenang et al. 2016; Ruzicka et al. 2007). Negative moderate associations between depressive symptoms or negative affect and religiosity (Meier 1982), spirituality (Keefe et al. 2001), and spiritual well-being (Lavin and Park 2011) were found in three out of ten studies. Other three studies found no significant associations between these outcome measures and religiosity (McParland and Knussen 2010), spirituality (Bartlett et al. 2003), and spiritual well-being (Ruzicka et al. 2007). Mixed results were found in other three studies (Ammondson 2009; Harrison et al. 2005; Nsamenang et al. 2016), with the significance and strength of the associations varying as a function of the criterion variables and religiosity/spirituality domains considered. For the most part, depressive symptoms, anxiety symptoms and negative affect were negatively associated with spirituality and spiritual well-being (Ammondson 2009; Nsamenang et al. 2016), but not with religiosity and faith (Ammondson 2009; Nsamenang et al. 2016). Harrison et al. (2005) found that church attendance, but not intrinsic religiosity and prayer/bible study, was negatively associated with somatization, interpersonal sensitivity, depression, and anxiety. One study found a positive strong association between depressive symptoms and religious and spiritual struggles (Harris et al. 2017).

No other clear and consistent patterns of associations emerged between religiosity and spirituality and these criterion measures. However, when considering spiritual well-being and its reverse (religious/spiritual distress) together, those with higher spiritual well-being and lower religious/spiritual distress did evidence a tendency to endorse lower levels of depressive, anxiety and other psychological symptoms, such as negative affect.

Associations with Better Psychological Function

Only five studies examined the associations between religiosity/spirituality and better psychological function (Bartlett et al. 2003; Dezutter et al. 2009; Keefe et al. 2001; Rippentrop et al. 2005; Rzeszutek et al. 2017). Two of these studies found positive moderate associations between better psychological function and spirituality (Keefe et al. 2001; Rzeszutek et al. 2017). The remaining studies showed mixed findings, with the significance and strength of the associations found depending on

the criterion variables and religiosity/spirituality domains considered (*cf*., Table 5). For the most part, in the three studies reporting mixed findings, spirituality as transcendence (Bartlett et al. 2003), spirituality as symbolic inclusion/exclusion (Dezutter et al. 2009), or spirituality as daily spiritual experience, forgiveness, religious support or religious/spiritual intensity (Rippentrop et al. 2005) were positively and weakly associated with either positive affect (Bartlett et al. 2003), subjective well-being (Dezutter et al. 2009) or perceived mental health (Rippentrop et al. 2005). Remaining associations between different domains of religiosity/spirituality and different domains better psychological function were nonsignificant (Bartlett et al. 2003; Dezutter et al. 2009; Rippentrop et al. 2005).

Overall, these findings suggest that people describing themselves as more "spiritual" tend to endorse better psychological function. Although six (40%) non-statistically significant associations between better psychological function and spirituality emerged, most ($n=9$, 60%) association coefficients between psychological function and spirituality reported were positive and moderate. No significant negative associations were found.

Associations Between Religiosity/Spirituality and Pain-Related Beliefs, Coping Responses, and Catastrophizing

Five studies focused on the correlation between religiosity/spirituality and general (i.e., not pain-specific) coping responses (Büssing and Koenig 2008; Büssing et al. 2009; Dezutter et al. 2011; Dunn 2005; Keefe et al. 2001). Two of these studies (Büssing and Koenig 2008; Büssing et al. 2009) found positive moderate to strong associations between the spirituality and trust in God's help, conscious living, positive attitudes, reappraisal of illness as chance, and search for alternative help. Positive associations were also found between (1) non-religious coping and the frequency of prayer (Dezutter et al. 2011), (2) religious coping and religious and/or spiritual well-being (Dunn 2005), and (3) positive religious/spiritual coping or salience of religion for coping and spirituality (Keefe et al. 2001). Nonsignificant pattern of associations, however, were found for the remaining coping responses considered: trust in medical help, escape from illness, non-religious coping, and negative religious/spiritual coping (*cf*., Table 6; Büssing and Koenig 2008; Büssing et al. 2009; Dunn 2005; Keefe et al. 2001).

Only two articles (Gomes et al. 2018; Ruzicka et al. 2007) estimated an association between religiosity/spirituality and pain beliefs, while the study from Harris et al. (2017) computed the associations between measures of religiosity/spirituality and pain catastrophizing. While nonsignificant associations were found between spiritual well-being and medical cure for pain, usefulness of medication, personal control over pain, disability as caused by pain, pain as a signal of harm, as well as organic and psychologic pain beliefs (Gomes et al. 2018; Ruzicka et al. 2007), positive significant moderate associations were found between spirituality (as hope/optimism) and the beliefs that emotions influence pain and that others should be solicitous in response to pain (Gomes et al. 2018). Spiritual struggles were also found to be positively strongly associated with catastrophizing (Harris et al. 2017).

Table 6 Summary of the findings: association between religiosity/spirituality and pain-related beliefs, coping and catastrophizing

Author (year)	Statistical analysis of interest	Association between religiosity/spirituality and pain-related beliefs	Association between religiosity/spirituality and coping	Association between religiosity/spirituality and catastrophizing
Büssing and Koenig (2008)	Correlation	N/A	AKU and religiosity/spirituality: Trust in God's help: $r = .60$, $p < .01$; Conscious living and positive attitudes: $r = .22$, $p < .01$; Trust in medical help: $r = -.033$, *ns*; Reappraisal of illness as chance: $r = .34$, $p < .01$; Escape from illness: $r = .004$, *ns*	N/A
Büssing et al. (2009)	Correlation	N/A	AKU and religiosity/spirituality[a]: Trust in God's help: .33, $p < .01 < r < .79$, $p < .01$; Conscious and healthy way of living: .16, $p < .001 < r < .26$, $p < .001$; Positive attitudes: .20, $p < .01 < r < .26$, $p < .01$; Trust in medical help: − .02, *ns* $< r <$ .04, *ns*; Reappraisal of illness as chance: $r = .43$, $p < .01 < r < .62$, $p < .01$; Search for alternative help: .10, *ns* $< r <$ .18, $p < .01$; Escape from Illness: − .09, *ns* $< r <$ − .01, *ns*; [a]Subscales: trust in higher source, search for meaningful support, positive interpretation of disease, support of life through spirituality	N/A
Dezutter et al. (2011)	Correlation	N/A	COPE and prayer: $r = .33$, $p < .01$	N/A

Table 6 (continued)

Author (year)	Statistical analysis of interest	Association between religiosity/spirituality and pain-related beliefs	Association between religiosity/spirituality and coping	Association between religiosity/spirituality and catastrophizing
Dunn (2005)	Structural equation modeling	N/A	Non-religious coping and spiritual well-being: $b = -.04$, *ns* Religious coping and spiritual well-being: $b = .58$, $p < .05$	N/A
Gomes et al. (2018)	Correlation	SOPA-28 and beliefs: Medical cure: $r = .19$, *ns*; Pain control: $r = -.15$, *ns*; Solicitude: $r = .11$, *ns*; Disability: $r = -.12$, *ns*; Medication: $r = .036$, *ns*; Emotion: $r = .023$, *ns*; Harm: $r = .057$, *ns*. SOPA-28 and hope/optimism: Medical cure: $r = -.081$, *ns*; Pain control: $r = .21$, *ns*; Solicitude: $r = .32$, $p < .05$; Disability: $r = -.13$, *ns*; Medication: $r = .12$, *ns*; Emotion: $r = .30$, $p < .05$; Harm: $r = -.024$, *ns*.	N/A	N/A
Harris et al. (2017)	Correlation	N/A	N/A	PCS and religious and spiritual struggles: $r = .53$, $p < .001$

Table 6 (continued)

Author (year)	Statistical analysis of interest	Association between religiosity/spirituality and pain-related beliefs	Association between religiosity/spirituality and coping	Association between religiosity/spirituality and catastrophizing
Keefe et al. (2001)	Standardized maximum likelihood estimates for within-Pearson relations	N/A	Positive religious/spiritual coping and spirituality: $b = .41, p < .001$; Negative religious/spiritual coping and spirituality: $b = -.01$, *ns*; Salience of religion for coping and spirituality: $b = .40, p < .001$	N/A
Ruzicka et al. (2007)	Correlation	PBQ organic and spirituality: $r = .001$, *ns* PBQ psychologic and spirituality: $r = .08$, *ns*	N/A	N/A

AKU, Adaptive Coping with Disease Scale; COPE, Coping orientation to problems experienced inventory; SOPA-28, 28-item survey of pain attitudes

Associations Between Religiosity/Spirituality and Physical/Psychological Function as a Function of Study Design Features

As shown in Table 7, the studies differed in respect to the study sample homogeneity regarding pain etiology and sample sizes, and religiosity/spirituality measure/domain measured. Overall, the findings regarding the associations between measures of religiosity/spirituality and measures of criterion variables were inconsistent. The presence of a significant association between religiosity/spirituality and one of these criterion measures seemed to depend largely on the specific measure of domain of religiosity/spirituality used/assessed. In fact, in most studies for which mixed results were observed, the direction and significance of the association depended on the religiosity/spirituality domain assessed (Ammondson 2009; Dezutter et al. 2009; Harrison et al. 2005; Nsamenang et al. 2016; Rippentrop et al. 2005).

Associations with Pain Intensity

Six out of eight studies assessing pain intensity had a heterogeneous sample regarding pain etiology. The predominant trend for these studies was of nonsignificant associations between pain intensity and religiosity/spirituality (Dezutter et al. 2010, 2011; McParland and Knussen 2010; Ruzicka et al. 2007). For the two homogenous studies assessing pain intensity, on the other hand, no specific trend of results seemed to emerge (Cooper-Effa et al. 2001; Harrison et al. 2005). There was a predominant trend of nonsignificant associations either for studies with small samples (Cooper-Effa et al. 2001; McParland and Knussen 2010) as for those with large samples (Dezutter et al. 2010, 2011; Ruzicka et al. 2007). Two out of four studies assessing spiritual well-being showed negative associations with pain intensity (Dunn 2005; Lavin and Park 2011), while the remaining two studies assessing this domain of religiosity/spirituality reported nonsignificant associations (Cooper-Effa et al. 2001; Ruzicka et al. 2007). The trend for studies focusing of religiosity, though, was for nonsignificant associations (i.e., nonsignificant for three out of four of these studies; (Dezutter et al. 2010, 2011; McParland and Knussen 2010).

Associations with Pain Interference/Disability and Better Physical Function

Four out of six studies reporting associations between religiosity/spirituality and pain interference/disability had a heterogeneous study population. No predominant trend was observed in the direction of associations for these studies, as a negative association was found by Ruzicka et al., (2007), a positive association was found by Harris and colleagues (Harris et al. 2017), a nonsignificant association was found by McParland and Knussen (2010), and mixed results were observed by Rippentrop et al., (2005). The absence of a predominant trend was also observed for the two studies with homogeneous study population (Cooper-Effa et al. 2001; Nsamenang et al. 2016). The trend for the studies with small samples was either of nonsignificant associations (Cooper-Effa et al. 2001; McParland and Knussen 2010) or of mixed results (Nsamenang et al. 2016; Rippentrop et al. 2005). Both studies with large samples found weak to moderate, either positive (Harris et al. 2017) or

Table 7 Summary of the findings: direction of association with outcome measures by population, sample size, pain duration, and construct measured

	Pain intensity				Pain interference/disability				(Better) physical function				Anxiety, depression and/or (worse) psychological function				(Better) psychological function			
	−	n.s.	+	Mixed-results	−	n.s.	+	Mixed-results	−	n.s.	+	Mixed-results	−	n.s.	+	Mixed-results	−	n.s.	+	Mixed-results
Population (pain etiology)																				
Homogenous		1		1		1		1				1	1	1		2			2	1
Heterogeneous	2	4			1	1	1	1		1		1	2	2	1	1				2
Sample size																				
< 150		2		1		2		2				2	2	2		3			1	2
≥ 150	2	3			1		1			1			1	1	1				1	1
Religiosity/spirituality measure																				
Religiosity		3		1		1							1	1		1				
Attitudes towards religion																				1
Spirituality												1	1	1					2	1
Spiritual well-being	2	2			1	1		1		1			1	1		1				
Religious/spiritual distress							1								1					
Religiosity and/or spirituality								1				1				1				1
Total number of studies	2	5		1	1	2	1	2		1		2	3	3	1	3			2	3

negative (Ruzicka et al. 2007), associations between measures of pain interference or disability and measures of religious/spiritual distress or of spiritual well-being, respectively.

The two studies assessing the association between spiritual well-being and pain interference/disability reported either a nonsignificant association (Cooper-Effa et al. 2001) or mixed results (Nsamenang et al. 2016). The only study assessing religiosity (McParland and Knussen 2010) reported a nonsignificant association with pain interference/disability. The study evaluating the association between religiosity and/or spirituality (Rippentrop et al. 2005) presented mixed findings, with the significance of the associations varying according to the dimension of religiosity/spirituality considered. Finally, when religious and spiritual struggles were considered as a domain of religiosity/spirituality (Harris et al. 2017), positive moderate associations with pain interference/disability emerged. No clear trend was observed in findings regarding the associations between religiosity/spirituality and better physical function, considering the design features of the three studies examining these associations (Bartlett et al. 2003; Lavin and Park 2011; Rippentrop et al. 2005).

Associations with Depressive Symptoms, Anxiety Symptoms, and/or Worse Psychological Function

The predominant trend of the studies with heterogeneous study population and assessing the association between religiosity/spirituality and worse psychological function was either of negative (Lavin and Park 2011; Meier 1982) or nonsignificant associations (McParland and Knussen 2010; Ruzicka et al. 2007). Half of the studies with homogenous samples, on the contrary, reported mixed results (Harrison et al. 2005; Nsamenang et al. 2016), with the remaining two having found either negative associations (Keefe et al. 2001) or nonsignificant associations (Bartlett et al. 2003). The main trend for studies with small samples was of mixed results (Ammondson 2009; Harrison et al. 2005; Nsamenang et al. 2016), while in two studies a negative association was found (Keefe et al. 2001; Meier 1982) and the remaining two studies associations were nonsignificant (Bartlett et al. 2003; McParland and Knussen 2010). Only three studies reporting association between religiosity/spirituality and worse psychological function had large samples (Harris et al. 2017; Lavin and Park 2011; Ruzicka et al. 2007). These studies found positive (Harris et al. 2017), negative (Lavin and Park 2011) and nonsignificant (Ruzicka et al. 2007) associations between religiosity and these criterion variables.

The predominant trend in the association between religiosity, spirituality, spiritual well-being, and religiosity and/or spirituality, and these criterion variables was either of negative (Keefe et al. 2001; Lavin and Park 2011; Meier 1982), nonsignificant (Bartlett et al. 2003; McParland and Knussen 2010; Ruzicka et al. 2007), or of mixed results (Ammondson 2009; Harrison et al. 2005; Nsamenang et al. 2016). In these cases, the significance of negative associations between religiosity/spirituality and these criterion variables depended on the specific religiosity/spirituality domain considered. The only study showing a positive moderate association between religiosity/spirituality and worse psychological function used a measure of religious and spiritual struggles (Harris et al. 2017).

Associations with Better Psychological Function

The trend of associations between religiosity and better psychological function was either positive or of mixed results. All of these studies with an heterogeneous sample found mixed results (Dezutter et al. 2009; Rippentrop et al. 2005), while most of these studies with an homogenous sample presenting positive association between these variables (Keefe et al. 2001; Rzeszutek et al. 2017). The predominant trend for studies using a measure of spirituality was of positive associations with better psychological function (Keefe et al. 2001; Rzeszutek et al. 2017), while only one study using a measure of spirituality found mixed results (Bartlett et al. 2003). For both studies using a measured of attitudes toward religion and religiosity and/or spirituality mixed results were found (Dezutter et al. 2009; Rippentrop et al. 2005), depending on the specific religiosity/spirituality domain considered. No main trend in the pattern of associations between these variables was observed in studies with small and large samples.

Discussion

This systematic review sought to summarize and critically appraise the available evidence regarding the associations between religion and religiosity/spirituality, on the one hand, and function, and pain-related beliefs, coping and catastrophizing on the other. We also sought to test hypotheses regarding the moderating role of religion and religiosity/spirituality on the association between adjustment to pain and pain-related beliefs and coping responses. Overall, the associations found were often weak and nonsignificant, especially those between measures religiosity/spirituality and measures of pain and physical function. However, when significant, measures of religiosity/spirituality and measures of positive psychological function were associated positively with one another. In addition, although not always statistically significant, when measures of spiritual well-being were significantly associated with measures of pain and disability, the associations were negative. Overall, the findings indicate that (1) no religious variable appears to play a significant role in physical function, but (2) religiosity, spirituality, and spiritual well-being may—at least for some individuals—play a role in psychological function in individuals with chronic pain.

Very few studies—eight studies—evaluated the associations between religiosity/spirituality and pain-related beliefs, coping responses or catastrophizing. As a result, no strong conclusions may be drawn regarding the associations between religiosity/spirituality and pain-related beliefs, coping responses, or catastrophizing. In addition, none of the included studies tested the moderation effect of spirituality and religion-related domains on the association between measures of patient function and measures of pain-related beliefs, coping responses and catastrophizing. As a result, conclusions regarding the hypothesized moderation effect of religious affiliation and religiosity/spirituality on such associations cannot be made.

The results regarding methodological quality revealed that most of the included studies had medium- to high-quality ratings, which provide some confidence to the

reliability of the findings that were reported. Based on these findings, some tentative conclusions might be drawn. First, the majority of the included studies (11 out of 20, 55%) were published after 2009. This suggests an increasing interest in studying the potential role of religiosity/spirituality in chronic pain. Second, we found that the associations between religiosity/spirituality and the review's criterion variables (i.e., function, pain-related beliefs and coping responses) appeared to vary depending on both (1) the specific domain of religiosity/spirituality and function, pain-related beliefs and coping responses assessed and (2) the measures used to evaluate each domain, regardless of other design and methodological differences between the studies. For example, when correlations were significant, measures of pain intensity tended to be weakly and negatively associated with spiritual well-being, while only nonsignificant associations emerged between pain intensity and religiosity. Moreover, and again when correlations were significant, measures of pain interference or disability were weakly to moderately negatively associated with spiritual well-being, and positively moderately associated with religious/spiritual distress, while only nonsignificant associations emerged between pain interference or disability and religiosity. While these findings suggest some patterns in associations, the great variety of measures used to assess the key domains in this area makes drawing strong conclusions challenging. This area of research would therefore benefit from the development of a common framework and standard definitions of the constructs religiosity and spirituality, which could then inform the development and adoption of a standard set of measures of religiosity and spirituality. Such work would facilitate future between-study comparisons and the therefore more conclusive answers to the research questions. Third, despite the challenges associated with the assessment of different domains using different measures, we did find a pattern that individuals with chronic pain who endorse higher levels of spiritual well-being tended to endorse better physical function, as indicated by lower scores on measures of pain and pain-related disability. Fourth, people who described themselves as being more "spiritual" tended to endorse better psychological function, when significant associations between these variables were found. On the other hand, individuals with chronic pain who endorsed higher levels of religious and/or spiritual distress tended to have greater severity of depressive symptoms. Fifth, religiosity was not found to be significantly associated with pain, physical function, or the coping responses employed by people with chronic pain. These tentative conclusions could be useful for the development of a model of the role of religion in chronic pain adjustment, which could then inform the development of a priori specific hypotheses to guide future research, helping to move research in this area from observational to theory- and hypothesis-based studies, the results of which could then serve to adapt the developing theoretical model.

Strengths and Limitations of the Current Systematic Review

To our knowledge this is the first systematic review to examine the associations between religiosity and spirituality and function, pain-related beliefs, coping responses and pain catastrophizing in individuals with chronic pain. The review has

a number of important strengths, including: (1) clarification of novel and relevant research questions highlighting research literature gaps that should be addressed in future research; (2) the use of a broad search strategy in 14 different databases, including the search for relevant trial registries and grey literature, and the hand search of reference lists of eligible articles and of review articles, accounting for decreasing the risk of publication bias; (3) the option for screening literature in four languages in order to decrease the risk of publication bias, resulting in the exclusion of only one study identified (published in German); and (4) the use of a rigorous framework on how to best conduct a narrative synthesis of findings in systematic reviews that was carefully put in place a priori.

A number of study limitations should, however, also be considered. First, this review is limited to only 20 cross-sectional and questionnaire-based studies. In line with the conclusions of previous reviews of the literature regarding the role of religiosity/spirituality on health outcomes in different patient populations with pain-related and non-pain-related conditions (Austin et al. 2018; Büssing et al. 2007; Closs et al. 2013; Jim et al. 2015; Rippentrop et al. 2005), the studies identified evidenced considerable methodological heterogeneity. The first source of studies heterogeneity regards the definition and operationalization of religiosity/spirituality constructs, with different studies using different measures covering different non-overlapping dimensions of religiosity/spirituality. Additionally, studies focused different pain populations, had samples with different sizes and sociodemographic characteristics, assessed different criterion variables using different measures, and used different measures of pain, function, pain-related beliefs and coping responses. The included studies also tended to collect data from small samples (50% of the included studies had less than 150 participants), evaluated samples from different, and frequently heterogeneous, populations. Most studies were conducted in the USA, and in most studies participants were middle-aged or older, hindering the generalizability of findings to younger people with chronic pain from other countries. Moreover, most of the studies used cross-sectional designs focusing on the association between at least one (out of a variety of) domain(s) of religiosity and/or spirituality and pain or function, regardless of religious affiliation. Additionally, included studies often provided incomplete information regarding study participants and procedures. These studies' features not only prevented us from conducting a meta-analysis, but also limited the generalizability of our conclusions and a more definitive clarification of the role of religious affiliation or religiosity/spirituality in pain intensity or adjustment to chronic pain, as well as on pain-related beliefs, coping responses, and catastrophizing. Globally, the adoption of common methodological frameworks, the implementation of comparable study designs, and the use of measures of religiosity/spirituality and of pain-related beliefs, pain-coping responses and pain catastrophizing drawn from a more consensual definition of these constructs in future research would be useful to clarify the research questions we sought to address here. To facilitate study comparisons for future reviews on this topic, future research should also clearly report key sociodemographic and clinical characteristics of participants (e.g., age, sex, educational level, socioeconomic status, religious affiliation, pain condition/etiology, duration of pain). Second, only a very limited number of studies, and with considerable methodological heterogeneity, examined the association between

religiosity/spirituality and the study criterion variables of pain-related beliefs, coping responses and pain catastrophizing, preventing us from being able to draw any definitive conclusion regarding these associations. Third, the designs used in the identified studies were all cross-sectional/observational designs. As a result, we are unable to draw any causal inferences in regards to the associations between religiosity and spirituality, on the one hand, and measures of pain, pain beliefs, pain-coping responses, and function, on the other. Longitudinal research with larger samples is needed to better understand the influence of religious variables on pain and function in individuals with chronic pain. Fourth, the use of a customized quality assessment tool, although adapted from formerly validated tools, may have limited the validity of the quality assessment. Fifth, assessment of the presence of chronic pain in studies' participants was not adequate in a number of studies in which pain duration (of at least 3 months) was not reported. This was true for 14 (70%) out 20 included studies, although participants were identified by the study investigators as having chronic pain (8 [40%] of the studies) or as having a primary medical condition often associated with chronic pain (6 [30%])—e.g., rheumatoid arthritis, fibromyalgia or skill cell disease. Future research on chronic pain should assess pain duration and specify as inclusion criteria the presence of clinically significant and disabling pain for at least 3 months.

Conclusions

Despite the study's limitations, the findings from this systematic review reveal that certain dimensions of religiosity/spirituality appear to be associated with pain and psychological function in people with chronic pain, in at least some chronic pain populations. These findings suggest that, viewing oneself as being "spiritual," regardless of religiosity and religious affiliation, may be a useful resource for psychological adjustment. This suggests the need for considering the role of religiosity/spirituality on psychological adjustment in context of patient care. An improved understanding of the role that religion plays in the lives of individuals with chronic pain would be facilitated by (1) the development of a theoretical model informed by the findings from this review and (2) efforts to clarify and standardize definitions and measure of the key domains, ideally based on a theoretical model.

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Compliance with Ethical Standards

Conflict of interest AFV has received a research grant attributed by the Portuguese Foundation for Science and Technology (SFRH/BPD/121452/2016). The remaining authors declare that they have no conflict of interest.

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