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Garssen, Bert; Visser, Anja; Pool, Grieteke

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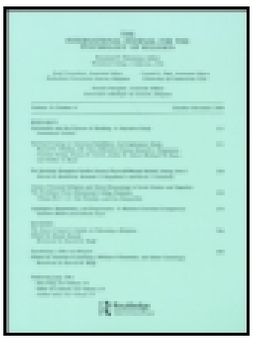

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Does Spirituality or Religion Positively Affect Mental Health? Meta-analysis of Longitudinal Studies

Bert Garssen [a,b], Anja Visser [a,c], and Grieteke Pool[b]

[a]Helen Dowling Institute, Centre for Psycho-Oncology, Bilthoven, The Netherlands; [b]Department Health Psychology, University Medical Center Groningen, Groningen, The Netherlands; [c]Faculty of Theology and Religious Studies, University of Groningen, Groningen, The Netherlands

ABSTRACT

The objective of this meta-analysis was to determine the longitudinal positive effect of religion or spirituality (R/S) on mental health. We summarized 48 longitudinal studies (59 independent samples) using a random effects model. Mental health was operationalized as a continuous and a dichotomous distress measure, life satisfaction, well-being, and quality of life. R/S included participation in public and private religious activities, support from church members, importance of religion, intrinsic religiousness, positive religious coping, meaningfulness, and composite measures. The meta-analysis yielded a significant, but small overall effect size of r = .08 (95% CI: 0.06 to 0.10). Of eight R/S predictors that were distinguished, only participation in public religious activities and importance of religion were significantly related to mental health (r = .08 and r = .09, respectively; 95% CI: 0.04 to 0.11 and 0.05 to 0.12, respectively). In conclusion, there is evidence for a positive effect of R/S on mental health, but this effect is small.

Introduction

A great number of studies showed that religion and spirituality (R/S) affect many areas of one's life, including well-being, distress, life satisfaction, and quality of life. In the present study, we will refer to these experiences as "mental health." Religion and spirituality are overlapping concepts. Religion relates to a person's adherence to beliefs, values, and practices proposed by an organized institution that is devoted to the search for the divine through prescribed ways of viewing and living life (Mytko & Knight, 1999). We define spirituality in terms of a subjective experience, as "one's striving for and experience of a connection with the essence of life" of which the experiences of meaning in life and connectedness are central elements (de Jager Meezenbroek et al., 2012a). People may consider themselves religious but not very spiritual, spiritual but not religious, both or neither of them. This meta-analysis examines how large the effect of R/S on mental health is, but first is discussed how such an effect can be brought about.

Three mechanisms have been proposed that might explain how R/S affects mental health: social support and cultural embeddedness, meaning-making and self-regulation (Garssen, Uwland-Sikkema, & Visser, 2015). Church attendance and other organized activities with fellow believers might increase the amount of social support that is received, and relationships with family members and friends might also be of higher quality for religious persons. A review by Koenig and Larson confirms this hypothesis, because they found a relationship between religious involvement and greater social support in virtually all (19 of 20) studies. They explain this finding by suggesting

CONTACT Bert Garssen b.garssen@ziggo.nl Department Health Psychology, Rijksuniversiteit Groningen, A. Deusinglaan 1, Groningen 9713 AV, The Netherlands.

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that most religious teachings prescribe support and care for one another. In the same review, they found that most (35 of 38) studies showed that greater religiousness or similarity in religious backgrounds predicted greater marital happiness or stability (Koenig & Larson, 2001). Being a church member also implies sharing a common system of values and meaning. In a recent study, it was shown that this cultural aspect of religious belonging had a positive effect on mental health above the effect of social support (ten kate, de koster, & van der waal, 2017). Relatedly, R/S can provide emotional/spiritual support through the experience of the presence of a personally interested God, who listens to and comforts those who are grieving or have serious problems (Garssen et al., 2015).

Several authors, such as James and Wells, discussed the meaning-making function of R/S (James & Wells, 2003). They suggest that a religious or spiritual belief system enables individuals to find meaning in stressful life events that are otherwise difficult to explain. This would help to maintain a sense of control and predictability of the world. Other studies have confirmed that belief systems play a beneficial role in coping with physical illness by providing a new meaning to a disease (Blow et al., 2011).

Finally, James and Wells propose a self-regulation mechanism through which religious beliefs and activities direct the current of thought, attention, and behavior. This may reduce any negative impact of stressful experiences. For example, the belief that certain thoughts are sinful can help a person to reduce these thoughts. Also, meditative prayer suspends worry or rumination. In the words of Baetz and Toews: "Religious behaviors that contribute to self-regulation by reducing self-focus and worry while producing a calming effect (for example, contemplative prayer, mindfulness, meditation, and religious rites) are positively associated with mental health" (Baetz & Toews, 2009, p. 294).

Thus, it seems clear that R/S could positively affect mental health, but it is not clear how strong this effect is and whether this is likely to be a causal effect. Several meta-analyses have provided evidence that the strength of the relationship is small to moderate, between r = .03 and r = .41 (Ano & Vasconcelles, 2005; Forouhari et al., 2019; Hackney & Sanders, 2003; Hodapp & Zwingmann, 2019; Salsman et al., 2015; Sawatzky, Ratner, & Chiu, 2005; Smith, McCullough, & Poll, 2003; Winger, Adams, & Mosher, 2016; Yonker, Schnabelrauch, & Dehaan, 2012). See Supplementary Table 1, available online, for further details on these studies.

However, the great majority of the studies included in these meta-analyses used a cross-sectional design, and no distinction was made between cross-sectional and longitudinal designs. A cross-sectional design is questionable, because it cannot be assumed from cross-sectional studies that a positive outcome demonstrates that R/S promotes mental health. It may also be the other way around, which has been demonstrated for the church attendance–depression relationship (Li, Okereke, Chang, Kawachi, & Vanderweele, 2016; Maselko, Hayward, Hanlon, Buka, & Meador, 2012): People may less often visit a church because of experiencing depressive symptoms. A restriction of a meta-analysis to longitudinal studies is necessary to provide an indication for the existence of causal relationships, but so far such studies have shown mixed findings (Visser, Garssen, & Vingerhoets, 2010).

This meta-analysis will not provide a definitive answer to the question of causality between R/S and mental health. Only the experimental manipulation of R/S could provide more certainty on the causal relationship. Manipulation of the level of R/S of a patient is part of several types of therapeutic interventions (Oh & Kim, 2014; Vos, Craig, & Cooper, 2015) including meditation. However, a host of other factors will also affect the outcome of these interventions, such as the expectations people have about the advantages they will experience from their participation, learning to relax, acquiring more coping abilities, and the quality of the therapeutic relationship. Wachholtz and Pargament settled many of these objections in their study (Wachholtz & Pargament, 2005). They compared the effects of three intervention modes: relaxation, secular meditation, and spiritual meditation. The three interventions were found to induce similar levels of relaxation. However, the spiritual meditation group showed the largest gain in spiritual and religious variables, and also improved most with respect to well-being and distress. This suggests a causal relationship between R/S and mental health.

Of course, proving in an intervention study that R/S has an effect on mental health, does not undo the possibility that in normal life mental health may also affect R/S.

Another factor that limits the value of existing meta-analyses is that the effect sizes used were correlation coefficients that were unadjusted for confounding variables. It is considered essential for individual studies to include confounding factors in an analysis of the effects of a predictor on the outcome, and for the same reason, it should be applied in meta-analyses. Indeed, it appeared that the conclusions in some of the reviewed studies were clearly different when they were based on zero-order correlations than when they were based on regression analyses that included several demographic variables as confounders (Hebert, Zdaniuk, Schulz, & Scheier, 2009; Kim & Seidlitz, 2002).

Existing meta-analyses also did not distinguish between different types of mental health or were restricted to a specific population. This makes it difficult to understand when R/S is or is not related to mental health and to which aspects of mental health it does or does not relate. In some meta-analyses, the outcome variables included concepts broader than mental health, such as self-esteem, guilt, social dysfunction, and anger (Ano & Vasconcelles, 2005; Hackney & Sanders, 2003; Sawatzky et al., 2005). Others were restricted to depression (Smith & Sullivan, 2003), anxiety (Forouhari et al., 2019) or quality of life (Sawatzky et al., 2005). In addition, some meta-analyses were confined to religious coping (Ano & Vasconcelles, 2005) or meaning in life (Winger et al., 2016), some focused solely on adolescents and young adults or students (Forouhari et al., 2019; Yonker et al., 2012), and others focused only on people with cancer (Salsman et al., 2015; Winger et al., 2016).

In line with the observations above, a recent review concluded that "An important step forward in religion and health research would be a series of meta-analyses for different health outcomes in which restriction was made to longitudinal studies, with good confounding control, including control for baseline outcome" (Vanderweele, 2017). In the current meta-analysis we have taken this recommendation to heart by 1) examining only longitudinal studies, 2) examining different types of samples, R/S predictors and types of well-being outcome variables, and 3) excluding studies that used a questionable R/S scale, especially R/S measures that are confounded with well-being (Garssen, Visser, & de Jager Meezenbroek, 2016; Koenig, 2008; Migdal & MacDonald, 2013), and 4) using association measures, such as regression coefficients, from which confounding effects have been eliminated. The focus is on outcome measures that reflect the presence of positive functioning – i.e. well-being, positive mood, life satisfaction – and/or a lack of negative functioning – i.e. distress or negative mood -, which are summarized in this text under the term "mental health". For the sake of clarity, variables that may be related to mental health, but are not the same as mental health, was not taken into account, such as posttraumatic growth, physiological responses, unhealthy behavior, sleeping problems, medical decisions, or marital conflicts. The reason for our special interest in the positive consequences of R/S is that most studies, especially intervention studies, were stimulated by the attraction to this potential outcome.

In the current study, the following research questions were evaluated: 1. Does R/S have a positive effect on mental health? 2. Does the effect depend on the characteristics of the study, such as the type of sample, the age category of the sample, the sample size, and the follow-up? 3. What is the effect of different indices of R/S separately? 4. What is the effect of each type of outcome separately?

Methods

Data collection

A review protocol was used for the selection of publications that includes the above-mentioned review questions, and the research strategy and inclusion/exclusion criteria, which are discussed below. Articles were searched for in Web of Science, Pubmed, Psycinfo, and Cinahl till April 2019 using the following search command: Title keywords Spiritual*, Relig*, Faith, Church attendance, or (Meaning in the title and (Spiritual*, Relig*, or Faith as topic keywords)) in combination with the title or topic words Longitudinal, Prospective or Predictor*, and title or topic keywords distress, anxiety, depression, well-being, mood, adjustment, "posttraumatic growth," "positive consequences,"

"life satisfaction," "quality of life," 'mental health,' psychiat*, or DSM*. Topic keywords, used in Web of Science, are MeSH Terms in Pubmed. Included were published articles about longitudinal studies on the relationship between R/S and mental health, written in English and including an effect size measure that could be converted into a partial r. All information was independently extracted by the first two authors using the review protocol, which can be found in Supplementary file 2. In case of discrepancies, arguments were shared by e-mail until disagreements were solved.

Exclusion criteria

Because the focus was on the positive contribution of R/S to mental health, studies, and findings were not included regarding negative aspects of religion, such as religious distress, negative religious coping, or religious struggle. "Extrinsic religiosity" was not taken into account either, as it appeared to be positively related to depression (Hodapp & Zwingmann, 2019; Smith et al., 2003).

Other exclusion criteria were: (1) Longitudinal study with a measurement interval less than 3 months, (2) not having controlled for baseline values of the outcome variable, (3) insufficient operationalization of R/S or mental health, (4) less than 50 participants, (5) insufficient statistical tests (explanations, if necessary, of what was considered "insufficient" can be found in Supplementary Table 3, available online). All excluded studies are summarized in Supplementary Table 4. The first four criteria were chosen for the following reasons:

Sub (1): Response bias may occur with a short interval, because participants might recall their previous responses. R/S and mental health also appear to be rather stable (Levin, Markides, & Ray, 1996; Levin & Taylor, 1998), which makes it unlikely that relationships found in studies with short-term follow-ups reflect effects of R/S on mental health. The interval must be long enough to allow for the occurrence of life events that potentially change the level of mental health, and for which R/S might act as a coping resource.

Sub (2): There should be control for baseline mental health to accurately estimate the predictive value of other variables on later mental health (Vanderweele, Jackson, & Li, 2016); studies that had not done so were excluded.

Sub (3): Studies were excluded that measured R/S with scales that contained items on mental health, because this may artificially inflate the association between R/S and mental health (de Jager Meezenbroek et al., 2012b; Garssen et al., 2016; Visser et al., 2010). An example of such a scale is the Spiritual Well-being Scale of the Functional Assessment of Chronic Illness Therapy (FACIT-Sp). Also excluded were studies in which a combined outcome measure was used that comprised more aspects of mental health than indicated in the Introduction, such as social role function, vitality, and satisfaction with work, community service, and sport.

Sub (4): Some authors argue for leaving out small-sized studies (Coyne, Thombs, & Hagedoorn, 2010). The main reason is that there is publication bias in these studies. Small-sized studies with null findings will be often be dismissed for being underpowered, whereas underpowered studies with significant findings may be often accepted. This practice will exaggerate the effect size estimates.

Several studies did not use scales with proven reliability and validity to measure R/S predictors and/or outcome variables. These studies have been included, but subgroup analyses were performed on studies with versus without psychometrically sound instruments.

Factors such as age, gender, and educational level are known to be associated with both R/S and mental health and may confound results. Therefore, studies were compared with and without sufficient control for these confounders.

Categories of study characteristics

To be able to compare the studies included in our meta-analysis, R/S variables were grouped into categories. Our aim was to stay as close as possible to the names and categories used in the reviewed articles. The categories chosen are:

(1) Public religious activities (church attendance and other forms of organized religiousness)
(2) Private religious activities (prayer, reading religious books, and listening to religious radio/TV)
(3) Support from church members (which also includes asking for prayer and religious support)
(4) Importance of religion: The feeling that religion is a strong guide in one's life: described in publications as finding religion important in one's life, commitment, religious salience, or even intrinsic religiousness, which is rather confusing. It concerns a stronger statement than the following category.
(5) Intrinsic religiousness concerns the feeling that one is a religious person, described in publications as subjective religiousness, strength of belief in God or a spiritual power, and religious/spiritual identity.
(6) Positive religious coping (which also includes seeking spiritual support)
(7) Meaningfulness (not explicitly related to religion).
(8) Composite measures (which consist of public and/or private religious activities in combination with intrinsic religiousness).

Other classifications have been made, such as in the nine meta-analyses represented in Supplementary Table 1. Seven of these nine meta-analyses made a distinction into 1–5 categories, which is in our view too small to cover all relevant aspects of R/S. A division comparable to ours was made by Smith et al., who used nine categories (Smith et al., 2003). Whichever division is made, it should be always based on the character of the scales used in studies to allow for a meta-analysis. This is a practical argument, but not merely so, as the scales used in the various studies are based on specific R/S concepts.

The outcome measures were divided into (1) distress-continuous, (2) distress-dichotomous, (3) life satisfaction, (4) well-being, and (5) the psychological component of quality of life. The distress-dichotomous category concerns a psychiatric diagnosis as obtained by a psychiatric interview, or by a cutoff score on a scale that has been proven valid because of its close correspondence to a psychiatric diagnosis obtained by an interview.

Because the effect of R/S on mental health may depend on the type of participants, four types of samples were distinguished: population sample, (college or university) students, people with somatic illnesses, and psychiatric patients, or people at risk of depression. "At risk of depression" means being the offspring of a parent with major depression. Age was divided into three categories: children or adolescents (inclusion criterion ≤18 years or mean age ≤16 years), adults (mean age ≤60 years), and elderly people (inclusion criterion ≥65 years or mean age ≥70 years). Studies were also divided into small-size (N ≤ 250), medium-size (N > 250 but <1,000), and large-size studies (N ≥ 1,000). Follow-up was divided into shorter than 1 year, 1 to 10 years, or longer than 10 years.

Methods applied in the meta-analysis

The codes for the meta-analysis concerned (a) characteristics of the publication (year, country); (b) type of predictor (see the eight categories mentioned above) and whether it was measured with a reliable and valid instrument; (c) the four outcome measures and whether these measures were reliable and valid; (d) sample characteristics, which included the four sample types, whether participants had experienced a major life event (loss of a beloved person, flood, 9/11 attack, surgery 3 months ago or less), sample size, percentage of women, mean age, follow-up in months; (e) type and number of control variables; (f) whether one or several R/S predictors were included in the analysis; and (g) the effect size. These codes were extracted by two independent raters.

Country was categorized as USA or elsewhere; year of data collection into <2000, 2000–2009, ≥2010; percentage of women into 0–33%, 34–66%, and 67–100%; number of control variables into 0–2, 3–4, and ≥5. A code for study quality was not included, but instead, it was determined whether or not reliable and valid measures were used for predictors and outcome variables, and the number of control variables.

Beta coefficients and Odds Ratios were used as the primary effect sizes. These parameters are rarely used as the primary effect sizes, because it is considered problematic to convert them into correlation coefficients that can be used in meta-analyses. However, Peterson and Brown presented the justification and the formulas for the conversion from beta coefficients to correlation coefficients (Peterson & Brown, 2005). Odds Ratios (with 95% CI) were converted to correlation coefficients according to a formula of Borenstein et al. (Borenstein, Hedges, Higgins, & Rothstein, 2009). For the meta-analysis, we used the program Comprehensive MetaAnalysis V2. This program converts correlation coefficients to z-values for the calculation of summary statistics, using random effects models. The summary statistics were reconverted to Pearson's r.

The direction of all effect sizes was coded such that positive values indicated the expected favorable effect of R/S on mental health. Several studies reported data on various R/S predictors or for various outcome measures. If more than one effect size was provided by a study, the program combines the effect sizes using robust variance estimation when determining the overall association between R/S and well-being, so that one independent sample contributes only one value to the omnibus analysis.

If a meta-analytic outcome showed high heterogeneity, moderator analyses were conducted. A mixed-effects approach for the moderator analysis was adopted to accommodate both the within-groups effects with a random-effects model and the between-group differences with a fixed-effects model. The moderator variables that have been chosen were demographic factors (age and gender), design factors (sample characteristics, sample size, follow-up, number of control variables, and type of predictor and outcome variables and their reliability and validity), and three other variables (where the studies have been performed and when, and whether people have experienced a major life event). The last moderator variable was chosen because it is often assumed that R/S would especially be important when coping with a stressful life event.

Several studies had included more than one R/S predictor in a regression analysis, which can lower a predictor's effect size. If, for instance, two predictors show a relatively high or very high association, then part of the variance explained by the first predictor is "attributed" to the second predictor. To test the relevance of this problem, studies with one R/S predictors were compared to studies with several R/S predictors.

We have also determined the effect of specific R/S predictors for specific outcome variables, whenever possible. This was only done if at least five effect sizes were available for the analysis of a particular predictor–outcome combination. For some predictors, this was attainable for only one outcome variable. If so, the number of obtainable effect sizes for the combination should be no more than three-fourths of the total number of effect sizes for that particular predictor. Otherwise, the two pieces of information would be based on roughly the same dataset.

Results

Summary of the prospective, longitudinal studies

Our search yielded 181 longitudinal studies on the relationship between R/S and mental health, of which 133 had to be rejected because they did not satisfy our criteria (Rejected studies are summarized in Supplementary Table 4). See Figure 1.

Meta-analysis

Forty-eight studies were available for the meta-analysis (N_{total} = 285,907). See Table 1 and Supplementary Table 6 for the meta-analytic details of each study, and Supplementary Table 5 for a short description of each study. Authors were approached to reduce the number of missing effect size, however, with little success (See Supplementary Table 4). Some of the included studies analyzed relevant subgroups, such as young vs old, or male vs female. These subgroups yield independent

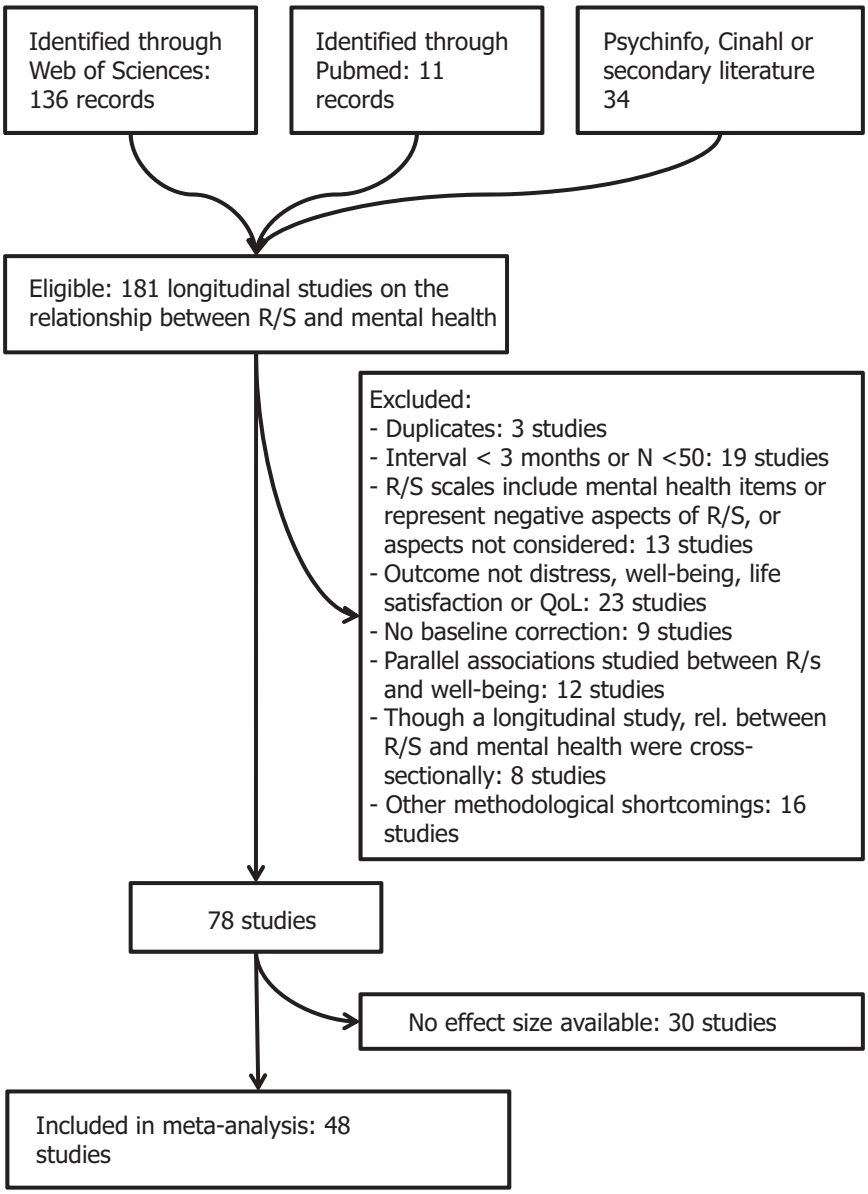

Figure 1. Flow diagram.

findings and are considered as separate samples in the next analyses. This makes the total number of independent samples available for meta-analysis 59.

The great majority of these studies came from the USA (36), two studies were from Canada, six studies were from Europe, and four studies were from elsewhere. Concerning the year of data collection (which may be many years before the year of publication), fifteen studies were conducted between 1990 and 1999, twenty-one between 2000 and 2009, and eight between 2010 and 2019 (date of collection was unknown in four studies). Sample size varied between 86 and 48,984. Distress was measured in 43 studies, well-being in five, life satisfaction in six, and quality of life in one study. Distress was measured as a continuous outcome variable in 27 studies, whereas 16 studies used a dichotomous outcome variable.

Table 1. Meta-analytic findings.

		Effect size			Heterogeneity		
	k [a]	*r*	*95% CI*	*p*	*Q*	*p*	I^2 [b]
Overall	59	.08	.06 to .10	.000	686	.000	92
Studies are from …	59				0	.98	
USA	45	.08	.06 to .10	.000	397	.000	89
Other countries	14	.08	.02 to .14	.01	264	.000	95
Study findings are collected …	55				10	.007	
Before 2000	21	.10	.06 to .14	.000	188	.000	89
2000–2009	25	.04	.00 to .07	.05	289	.000	92
≥2010	9	.14	.08 to .21	.000	138	.000	94
Sample characteristics	50				2	.54	
Population sample	26	.07	.04 to .11	.000	410	.000	94
Students	12	.12	.06 to .17	.000	79	.000	86
Somatically ill patients	8	.12	.01 to .22	.03	27	.000	74
Psychiatric patients or people at risk for depression [c]	4	.10	−.03 to .23	.11	11	.013	72
People experiencing a major life event	59				3	.08	
Yes	6	.12	.08 to .17	.000	6	.31	16
No	53	.08	.05 to .10	.000	676	.000	92
Age group	45				16	.92	
Children or adolescents	10	.10	.04 to .16	.001	36	.000	75
Adults	28	.09	.05 to .13	.000	231	.000	88
Elderly people	7	.10	.01 to .18	.03	111	.000	95
% women	51				2	.37	
0–33%	6	.08	.00 to .15	.05	14	.02	64
34–66%	31	.10	.07 to .13	.000	434	.000	93
67–100%	14	.05	.00 to .11	.05	150	.000	91
Sample size	59				6	.06	
N ≤ 250	21	.14	.08 to .21	.000	55	.000	64
N > 250 < 1.000	19	.08	.04 to .11	.000	62	.000	71
N ≥ 1.000	19	.06	.02 to .09	.001	559	.000	.96
Follow-up	59				8	.66	
< 1 year	11	.11	.04 to .17	.001	23	.01	57
1–10 years	42	.08	.05 to .10	.000	586	.000	93
> 10 years	6	.06	−.05 to .17	.27	74	.000	93
Number of control variables	59				0	.83	
0–2	14	.09	.03 to .16	.006	49	.000	74
3–4	24	.08	.05 to .12	.000	260	.000	91
5–7	21	.07	.04 to .11	.000	358	.000	94
R/S predictoren	58				2	.19	
One R/S predictor	20	.11	.06 to .15	.000	172	.000	89
Several R/S predictors in the same analysis	38	.07	.05 to .10	.000	378	.000	90
Predictor measure reliable and valid [b]	78				1	.30	
Yes	44	.08	.06 to .11	.000	518	.000	92
No	34	.06	.02 to .09	.001	416	.000	92
Outcome measure reliable and valid [b]	61				0	.95	
Yes	43	.08	.05 to .11	.000	527	.000	92
No	18	.08	.05 to .11	.000	130	.000	87
Predictors							
1. Participation in public religious activities	33	.08	.04 to .11	.000	687	.000	95
1a. Participation x distress-continuous	16	.06	−.03 to .15	.18	833	.000	98
1b. Participation x distress-dichotomous	14	.11	.06 to .15	.000	158	.000	92
2. Private religious activities	11	.06	.0 to .12	.05	174	.000	94
3. Support from church members	1						
4. Importance of religion	19	.09	.05 to .12	.000	158	.000	89
4a. Importance x distress-dichotomous	14	.10	.04 to .16	.001	115	.000	90
5. Intrinsic religiousness	9	.01	−.04 to .05	.70	46	.000	83
6. Positive religious coping	12	.06	−.04 to .17	.24	162	.000	94
7. Meaningfulness	2						
8. Composite measures	10	.02	−.02 to .06	.25	16	.06	44

(*Continued*)

Table 1. (Continued).

		Effect size			Heterogeneity		
	k [a]	*r*	*95% CI*	*p*	*Q*	*p*	*I*[b]
Outcome							
Distress – continuous [d]	32	.07	.01 to .12	.01	656	.000	95
Distress – dichotomous [d]	25	.09	.06 to .12	.000	383	.000	94
Life satisfaction	9	.10	.06 to .13	.000	10	.29	17
Well-being	8	.07	.00 to .14	.05	35	.000	80
Quality of life	1						

[a]*k* = number of independent samples (some studies included several independent samples)
[b]The number of valid predictors and outcome variables, respectively, which is more than the number of independent samples. Within a sample, one of these variables could be valid and the other one invalid.
[c]"At risk of depression" means being the offspring of a parent with major depression (this offspring had at baseline significantly more often major depression, compared to the low-risk participants)
[d]The 32 samples of the distress-continuous category included 20 data on depression and 12 on "general distress." All 25 samples of the distress-dichotomous category concerned a diagnosis of depression, except one sample of which both a depression diagnosis and an anxiety diagnosis was available that was combined by the meta-analytic program to one distress dichotomous measure.

Across the 59 samples, the random weighted average effect size was r = 0.08 (95% CI, 0.06– 0.10; p = .000; see Table 1). The index of heterogeneity was significant (Q = 686, p = .000), suggesting that effect sizes may be moderated by other variables.

Moderator analysis

The moderator analysis hardly yielded any subgroup with a different set of effect sizes (see Table 1). We present an example to clarify the data from the moderator analysis presented in Table 1: The 45 effect sizes of studies from the USA yielded a summary effect size of r = .08, which was significant. The Q-value was 397 and significant, meaning that the effect sizes were heterogeneous. The Q-value reflects the part attributed to differences in the true effects from study to study. The I^2 is another measure of heterogeneity, and was 89% in this analysis. The I^2 measure reflects the degree of inconsistency of effect sizes; values of 75% and higher are considered as high. The summary effect size for the fourteen effect sizes from other countries was r = .08, and also significant. The between subgroup variance was Q = 0 and non-significant, meaning that the two subgroups did not differ: Thus, the moderator did not explain excess variance, which could also be concluded from the large and overlapping confidence intervals for the two separate subgroups. Most between-subgroups Q-values were non-significant, indicating that the moderator analysis very rarely showed differences between conditions.

Only year of data collection (p = .007) seemed to have an effect on the relationship between R/S predictors and mental health. However, both older and newer studies had greater effect sizes than studies from 2000 to 2009. Nearly significant was the influence of sample size (p = .06), with higher effect sizes for smaller studies. Conclusions seemed not to be dependent on country, type of sample, having experienced a major life event or not, age, percentage of women, duration of follow-up, whether one or several R/S predictors were included in the same regression analysis, and quality of the study (number of control variables, and reliability and validity of the predictor and outcome variables).

Specific predictors and outcomes

With respect to type of R/S predictor, two predictors showed an overall effect on mental health: the frequency of church visits and other public religious activities (r = .08; p = .000), and importance of religion in one's life (r = .09; p = .000). With respect to the outcome variables, overall R/S was related to distress (continuous, r = .07, p = .01; dichotomous, r = .09, p = .000) and life satisfaction (r = .10,

p = .000), but not to well-being. However, the overlapping confidence intervals suggest that the relationships between R/S and the various indicators of mental health were not substantially different.

We have also determined the effect of specific R/S predictors for specific outcome variables, whenever possible. The effect of Participation in religious activities was strongest for the dichotomous distress measures (r = .11; p = .000). The effect of Importance of religion was also increased if the analysis was restricted to dichotomous distress measures (r = .10; p = .001)

Publication bias was tested to check whether having missed studies might have undermined the robustness of the findings, and especially to assess the possibility that small-scale studies with a null-finding are less often published, thus producing an unjust conclusion (See Supplementary file 7 for a funnel plot). Rosenthal's classical fail-safe N indicates that 6,639 studies would bring the overall effect size to a non-significant zero effect. Another approach for the assessment of publication bias is Duval and Tweedie's trim and fill procedure. The funnel plot indicated that small-scale studies with larger effect sizes were not over-represented. The trim and fill procedure showed that no study with an opposite effect size was needed to produce a symmetrical funnel plot. When this analysis was repeated for the most promising R/S predictors – Participation in public religious activities and Importance of religion – Rosenthal's classical fail-safe N would be 3,243 and 465 studies, respectively, and the funnel plot and the trim and fill procedure yielded the same result as for the whole sample of studies. Thus, distortion of the meta-analytical results due to publication bias seems unlikely.

Outliers

A boxplot of the correlation coefficients showed four outliers among the seven effect sizes in the study of Hsu et al., which are combined by the meta-analytic program as one sample (Hsu, 2014). This study was deleted, as was the effect size of the high-risk group of Miller et al., which was also an outlier (Miller et al., 2012). This reduces the number of available effect sizes to 57.

The deletion of outliers led to minor changes in the effect sizes (see Table 2). Positive religious coping appeared now to be also a significant predictor (r = .09, p = .03). Tests for publication bias led to similar conclusions.

Discussion

Meta-analyses have shown a consistent, though modest association between religiousness/spirituality (R/S) and mental health (distress, well-being, mental health, negative and positive mood, or life satisfaction). However, because their findings were mainly based on cross-sectional studies, these meta-analyses can provide little information on the nature of this relationship. The current article is the first meta-analysis that focuses exclusively on prospective, longitudinal studies on the relationship between spirituality and mental health and, thus, may give a more decisive answer to the possibility of causal relationships.

Our meta-analysis showed a small, though significant association between R/S and mental health. The overall effect size was r = .08, which implies that no more than 0.6% of the variance in mental health was explained by R/S. This correlation coefficient is smaller than any association reported in the earlier meta-analyses, except the recent meta-analysis of Hodapp and Zwingmann (2019). The outcomes appeared to be heterogeneous, also in most sub-analyses. A reason for heterogeneity could be the large variety of instruments used for measuring R/S factors and outcomes.

The moderator analysis yielded many non-significant findings and only one effect. Higher effect sizes were found in older and recent studies, compared to effect sizes from studies conducted between 2000 and 2009. This finding is difficult to interpret. Two R/S predictors showed a significant association with mental health: Participation in public religious activities and Importance of religion – though they still explained a small amount of variance in mental health

Table 2. Meta-analytic findings without the two outliers.

		Effect size			Heterogeneity		
	k [a]	r	95% CI	p	Q	p	I[b]
Overall	57	.08	.06-.10	.000	611	.000	91
Studies are from …	57				0	.64	
USA	44	.08	.05-.10	.000	378	.000	89
Other countries	13	.09	.03-.16	.005	2224	.000	95
Study findings are collected …	53				7	.04	
Before 2000	21	.10	.06-.14	.000	188	.000	89
2000–2009	24	.04	.00-.08	.03	246	.000	91
≥2010	8	.12	.04-.18	.001	120	.000	94
Sample characteristics	49				1	.78	
Population sample	26	.07	.04-.11	.000	410	.000	94
Students	11	.10	.04-.15	.000	61	.000	84
Somatically ill patients	8	.12	.01-.22	.03	27	.000	74
psychiatric patients or people at risk for depression [c]	4	.10	−.03-.23	.11	11	.000	72
People experiencing a major life event	57				3	.07	
Yes	6	.12	.08-.17	.000	6	.31	16
No	51	.09	.06-.11	.000	601	.000	92
Age group	44				0	.78	
Children or adolescents	10	.10	.04-.16	.001	37	.000	75
Adults	27	.08	.04-.12	.000	210	.000	88
Elderly people	7	.10	.01-.18	.03	111	.000	95
% women	49				2	.40	
0–33%	6	.08	.00-.15	.05	14	.02	64
34–66%	29	.10	.06-.13	.000	358	.000	92
67–100%	14	.05	.00-.11	.05	150	.000	91
Sample size	57				4	.15	
N ≤ 250	20	.13	.07-.18	.000	39	.01	52
N > 250 < 1.000	19	.08	.04-.11	.000	62	.000	71
N ≥ 1.000	18	.06	.03-.09	.000	504	.000	.96
Follow-up	57				1	.64	
< 1 year	11	.11	.04-.17	.001	23	.01	57
1–10 years	40	.08	.05-.10	.000	512	.000	92
> 10 years	6	.06	−.05-.17	.27	74	.000	93
Number of control variables	57				30	.86	
0–2	14	.09	.03-.16	.006	49	.000	74
3–4	23	.07	.04-.11	.000	239	.000	91
5–7	20	.08	.05-.11	.000	293	.000	94
R/S predictoren	56				2	.16	
One R/S predictor	20	.11	.06-.15	.000	172	.000	.89
Several R/S predictors in the same analysis	36	.07	.04-.10	.000	319	.000	.89
Predictor measure reliable and valid [b]	75				2	.21	
Yes	43	.08	.06-.11	.000	518	.000	92
No	32	.06	.03-.08	.000	159	.000	80
Outcome measure reliable and valid [b]	59				0	.95	
Yes	41	.08	.05-.11	.000	456	.000	91
No	18	.08	.05-.11	.000	131	.000	87
Predictors							
1. Participation in public religious activities	32	.09	.06-.12	.000	334	.000	91
1a. Participation x distress-continuous	15	.08	.01-.16	.04	469	.000	97
1b. Participation x distress-dichotomous	14	.11	.06-.15	.000	158	.000	92
2. Private religious activities	10	.05	−.01-.10	.13	118	.000	92
3. Support from church members	1						
4. Importance of religion	18	.07	.04-.11	.000	136	.000	88
4a. Importance x distress-dichotomous	13	.08	.02-,14	.005	108	.000	89
5. Intrinsic religiousness	9	.01	−.04-.05	.70	46	.000	83
6. Positive religious coping	11	.09	.01-.16	.03	44	.000	77
7. Meaningfulness	1						
8. Composite measures	10	.02	−.01-.06	.25	16	.06	44

(*Continued*)

Table 2. (Continued).

		Effect size			Heterogeneity		
	k [a]	r	95% CI	p	Q	p	I[b]
Outcome							
Distress – continuous	31	.07	.02-.12	.000	587	.000	95
Distress – dichotomous	24	.08	.05-.11	.000	363	.000	91
Life satisfaction	9	.10	.06-.13	.000	9	.29	17
Well-being	8	.07	.00-.14	.05	35	.000	80
Quality of life	1						

[a]K = number of independent samples (some studies included several independent samples)
[b]The number of valid predictors and outcome variables, respectively, which is more than the number of independent samples. Within a sample, one of these variables could be valid and the other one invalid.
[c]"At risk of depression" means being the offspring of a parent with major depression (this offspring had at baseline significantly more often major depression, compared to the low-risk participants)

variables. If the outcome was restricted to distress measured as a dichotomous variable, the effect sizes of these two variables became somewhat higher (r = .11 and r = .10, respectively). Deleting the two outliers decreased the effect size of the Importance of religion x distress dichotomous combination, but not the effect size of the Participation in public religious activities x distress dichotomous combination (explained variance of mental health 1.2% and 0.6%, respectively).

Theories on R/S have proposed that it may act as a coping resource, which suggests that R/S factors have a stronger effect or have only an effect if a person is exposed to adverse conditions. This was not confirmed when we analyzed the effect of being exposed to major stressful life situations, having a somatic disease, or being a psychiatric patient/at risk for depression.

It appears that several of our findings are in agreement with conclusions from earlier meta-analyses (See Supplementary Table 1), if comparisons are focused on equivalent constructs. A general similarity is that hardly any demographic or design factor moderated the R/S mental health relationship. Smith et al. found severe life events to be a moderator (Smith et al., 2003), which we did not find and neither did Hodapp and Zwingmann (Hodapp & Zwingmann, 2019). Also, in contrast with our findings – and those of Hodapp and Zwingmann – they found that intrinsic religiousness was a powerful predictor. However, Smith et al. may have included under this heading also importance of religion, which was a significant predictor in our analyses. Hackney & Sanders found a small effect for distress and a large effect on life satisfaction; the latter effect being in line with our findings (Hackney & Sanders, 2003). However, these authors are rather unclear about their categorization, which also applies to the meta-analysis of Sawatzky et al. (Sawatzky et al., 2005). Yonker et al. showed significant effects on depression and well-being, but not for anxiety (Yonker et al., 2012). We found similar effects for our distress outcomes, even though we did not make a distinction between depression and anxiety. They also demonstrated that "salience" was the most powerful R/S predictor. This predictor seems to resemble our "importance of religion," but their salience category is much broader.

In line with our findings, a meta-analysis of 36 years ago (Bergin, 1983) already concluded that studies "do not provide much more than marginal evidence for a positive effect of religion." However, it begs the question whether R/S has a weaker relationship to mental health than other psychological constructs. We found six meta-analyses examining the association between mental health and other psychological factors. Some of these meta-analyses reported beta coefficients. For reasons of comparability, we have converted these beta coefficients to correlation coefficients according to the calculation rules of Peterson and Brown (2005). All meta-analyses concerned findings of studies that controlled for baseline values of the outcome variables, but only two meta-analyses used studies that also included other confounding factors (Hakulinen et al., 2015; Schmitt, Branscombe, Postmes, & Garcia, 2014). The effect size for the association between marital quality and well-being was r = .25 in a meta-analysis of 27 studies (Proulx, Helms, & Buehler, 2007). Rood et al. examined the association between the response styles rumination and distraction with depression among children and adolescents in a meta-analysis of nine studies

(Rood, Roelofs, Bogels, Nolen-Hoeksema, & Schouten, 2009). They found an effect size of r = −.07 for rumination, whereas the association with distraction was non-significant. In a meta-analysis of 14 studies on the effect of perceived discrimination on well-being an overall effect size of r = −.15 was found (Schmitt et al., 2014). A meta-analysis of 10 studies on the association between personality and depression found for low extraversion an effect size of r = −.03, for high neuroticism r = .17, and for low conscientiousness r = −.04 (Hakulinen et al., 2015). A meta-analysis of 52 studies on the association between attributional style and depression reported an effect size of r = .15 (Huang, 2015). Finally, the relationship between positive emotionality and mental health was r = −.08 for depression (58 studies), and r = −.06 for anxiety (26 studies) (Khazanov & Ruscio, 2016). The lesson taken from this comparison is that R/S has a similar relationship to mental health as other psychological variables.

If the relationship between R/S factors and mental health is of modest magnitude, then how can one explain the fact that cross-sectional studies consistently demonstrated considerable associations between these aspects? One possibility is bi-directional causation (Li et al., 2016; Maselko et al., 2012). If R/S promotes mental health, and low mental health decreases R/S activities, the cross-sectional associations will be high. However, if the influence of the second causal link is excluded – in longitudinal studies that control for baseline values of the outcome variable – the association will be lower. Another possibility is that there is a common cause for R/S and mental health. Several studies have suggested that the variance in religiousness is to a large extent attributable to genetic factors (Smith et al., 2003), which seems to also hold for mental health (Lykken & Tellegen, 1996). However, one may doubt whether these two variables share the same genetic basis. A common factor might also be the environment in which children grow up; a warm and caring child-parent bond may be both a positive factor in the development of religious interests and a protective factor against depression (Smith et al., 2003). These common factors could cause analogous levels of both R/S and mental health, without the one factor having an effect on the other one. A third option concerns the possibility that R/S is intrinsically related to mental health, though a recent study showed that the two concepts can be empirically distinguished (Visser, Garssen, & Vingerhoets, 2017). All of these options predict a high positive cross-sectional relationship, but a weak longitudinal association if the baseline values of mental health are taken into account. Indeed, in some of the reviewed studies the cross-sectional association was significant, whereas a longitudinal association was not found (Braam, Deeg, Poppelaars, Beekman, & van Tilburg, 2007; Dew et al., 2010; Levin & Taylor, 1998; Perez, Little, & Henrich, 2009). The most obvious explanation, however, is that in cross-sectional analyses the absolute value of R/S is related to mental health, whereas longitudinal studies – by using baseline values of R/S as one of the predictors – focus on the relationship between changes in R/S and mental health. It is probable that the effect on changes is smaller than the effect on absolute values.

Limitations and strengths

An important problem of our and other reviews on R/S lies in the categorization of R/S aspects. It is a multifaceted concept and each concept may be related to mental health differently (Hackney & Sanders, 2003). We have tried to stay as close as possible to the actual description of the scales used by the authors of the reviewed studies. A strength of this study is that we have chosen to use rather narrow categories of R/S and outcome variables. This has led to more nuanced findings, compared to most previous reviews and meta-analyses, in which more global categories were chosen to maximize the number of effect sizes per category. To illustrate, the "behavioral R/S" category in the meta-analysis by Salsman et al. included public and private R/S activities, and religious coping (Salsman et al., 2015). In our meta-analysis, these three R/S categories produced clearly different findings.

The outcome measure in our meta-analysis was mental health, including general distress, anxiety, depression, life satisfaction, and general quality of life. Variables that may be related to mental health were not taken into account, especially posttraumatic growth, physiological responses, unhealthy

behavior, sleeping problems, medical decisions, or marital conflicts. So, we refrain from making any statement about R/S effects on these outcome measures.

In this field of research, the use of reliable and valid scales for the measurement of R/S appeared to be limited. A rather lenient criterion was applied in our meta-analysis for the evaluation of scales. Even if only one psychometric study with positive findings was available – which was often the case – the scale was judged as reliable and valid. On the other hand, it cannot be concluded that findings obtained with scales of unproven psychometric quality yield an incorrect picture; findings with such scales are less trustworthy, but not by definition false. In fact, the quality of the scales did not affect conclusions, as the meta-analysis showed no differences depending on the psychometric quality of the R/S scale.

In this meta-analysis, the focus was on the linear relationship between R/S and mental health, meaning that mental health would gradually increase with rising values of R/S. However, one could also expect that mental health is lowest among people who are somewhat uncertain about their spiritual attitude, implying the highest values of mental health among very spiritual people and people who consider themselves not spiritual at all; in other words, among those who are confident about their beliefs. Indeed, some longitudinal studies found a curvilinear association (King et al., 2007; Ronneberg, Miller, Dugan, & Porell, 2016; Schnittker, 2001). One of these studies found the expected relationship: the chance of being depressed at follow-up was lower with high and low church attendance, compared to moderate attendance (Ronneberg et al., 2016). However, the two other studies found more depression with high and low religious salience (Schnittker, 2001), and with extremely high and low private religiosity (King et al., 2007). So, these studies also not clearly support the general hypothesis of an effect of R/S on mental health.

We have limited our analysis to the main effects of R/S on mental health, and have disregarded interactive (moderating) effects. The study of interaction effects deserves a new meta-analysis. Some studies examined the moderating effect of R/S on the relationship between stressors and mental health in addition to its main effect. In those cases, and if a hierarchical regression analysis had been performed, we have included the effect sizes for the main effect of R/S on mental health.

This meta-analysis was limited to published studies written in English, of which the great majority came from the USA. Participants in most studies were Christian or atheist. Therefore, the findings may not be generalizable to other continents, cultures, and religions. We have not tried to find unpublished studies. That may be seen as a limitation, but the tests on publication bias indicate that this omission is unlikely to have a decisive influence on our conclusions.

We have used beta coefficients and Odds Ratios, which may have resulted in variability when estimating the unique effect of R/S facets on mental health outcomes, depending on the number and type of covariates included in the studies. However, Peterson and Brown showed that the conversion of beta coefficients into correlation coefficients was hardly affected by the number of covariates used in their sample of studies (Peterson & Brown, 2005). Moreover, we found no differences in effect sizes depending on the number of covariates. In so far there still may remain some doubt; the use of effect sizes that are heavily affected by uncontrolled covariates produces far more dubious findings. One of the critics mentioned, "Perhaps the most fundamental problem is that BEPs [beta estimate procedures] are not zero-order correlations" (Roth, Le, Oh, Van Iddekinge, & Bobko, 2018), but that is just what we do not want: association measures without control of confounders.

Future directions

The findings of the present study raise the question whether further research into the contribution of R/S to mental health (well-being, depression, anxiety, distress, life satisfaction, quality of life) is worthwhile. The heterogeneity of studies in the field suggests that one can endlessly search for relationships between all the various aspects of R/S and all the various aspects of mental health, but what is the practical significance of such studies? From a care perspective the conclusion might be that, although R/S is clearly a vital aspect of most people's lives that should not be neglected, it might

not have a substantial effect on mental health. Though there is a relationship and though its magnitude is comparable to those of psychological constructs, it is still rather weak.

Instead of continuing the search for the main effects of R/S on mental health, we suggest to pursue other roads. The most important recommendation is to employ outcomes that are theoretically closer to R/S than distress and well-being, such as sense of coherence, benefit finding, post-traumatic growth, sense of control, and spiritual well-being. Also recommended are cross-lagged designs with sufficiently long follow-up periods to prevent response bias but not too long to allow possible effects to fade away (Vanderweele et al., 2016). Such a design could untangle possible reciprocal causation between the predictor and outcome variables. We also advise to use scales with demonstrated reliability and validity, to ensure sufficient statistical power, and to focus on public religious activities and the importance of religion. Another fruitful approach may be to study the moderating effects of R/S on the relationship between stressful conditions and mental health and to use well-designed intervention studies that include comparison groups to control for the effect of relaxation and placebo-effects., such that the R/S component is isolated as far as possible.

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ORCID

Bert Garssen http://orcid.org/0000-0002-8165-9370
Anja Visser http://orcid.org/0000-0003-3956-3129

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