

Spirituality and Religiosity and Its Role in Health and Diseases

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Abstract Religiosity is a factor involved in the management of health and diseases/patient longevity. This review article uses comprehensive, evidence-based studies to evaluate the nature of religiosity that can be used in clinical studies, thus avoiding contradictory reports which arise from misinterpretation of religiosity. We conclude that religiosity is multidimensional in nature and ultimately associated with inherent protection against diseases and overall better quality of life. However, a number of untouched aspects of religiosity need to be investigated further before we can introduce religiosity in its fully functional form to the realm of health care.

Keywords Religiosity · Spirituality · Healthcare · Neurotheology · Hypertension · Depression

Introduction

There is constant debate concerning the impact of spirituality in today's Western medicine. While many modern scientists have overlooked this influence, a historical review of the world's major religions reveals just how relevant spirituality was throughout the development of particular religions. There are billions of people throughout the world who believe prayer and spirituality are just as vital for healing as modern medicine is, as

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religious practices and beliefs have consistently been a source of medical treatment for ages. However, there is a question of just what separates spirituality and religiosity, and how those two terms are distinct. On a more intimate level, spirituality encompasses the broad area of personal beliefs regarding one's relationship with a higher being, which in turn influence one's life decisions, actions, personality, and, as we will see soon, one's health. Religiosity, on the other hand, guides and informs those spiritual beliefs. Remarkably, religious beliefs have not only assisted in one's spiritual attainment of salvation, but also the improvement of one's physical health and temporal longevity. In light of this, the rapidly developing field of Neurotheology has aspired to search for the physiological cognitive changes associated with spirituality possibly responsible for such benefits.

A quick overview of various religious faiths around the world can show how spirituality, prayer and healing have each played a role in health and diseases in modern medicine.

Historical Evidence

One of the earliest religions dating back 3000 B.C., Hinduism is premised on achieving liberation through oneness with the supreme Reality, also referred to as Brahman or the higher Self. This entity is found in all, reflecting a spiritual belief commonly referred to as Vedanta (TK Venkateswaran 2000). Prana (Sanskrit word meaning breath) is the subtlest form of this biological energy and life-sustaining force. Consequently, prana is a central concept in Indian medicine (Chopra 1993). The development and balance of prana is known as "pranayama" and practiced through the ancient exercise of yoga. The maintenance and continuation of prana is vital, as the depletion of prana is said to lead to aging and death (Chopra 1993). In addition to yoga practices, meditative techniques and prayers have also been identified as various forms of healing techniques practiced by the Hindus throughout history. Ayurvedic medicine is one such ancient form of Indian traditional practice that has developed with Hinduism. Ayurveda, like yoga, is an ancient preventive medicine practice that stresses the connection between body and mind (Godagama and Hodgkinson 1998). It is a practice that affirms the central belief that all illnesses not only affect the physical body, but the mind as well. Thus, Indian medicinal practices aim to treat the body and mind together. Ayurveda uses a variety of healing practices including yoga, meditation, consumption of plants or herbs, massage therapy and lifestyle changes (Godagama and Hodgkinson 1998; Mishra 1994).

Buddhism dates back to 500 B.C. and originates from the teachings of the enlightened Northeast Indian Prince Siddhartha Gautama, also known as the Buddha. His path stressed the middle way, encouraging all followers to maintain a neutral and balanced world view, and the avoidance of the extremities of asceticism or hedonism available to humans (Jones 2000). According to Buddhism, each person is suffering and needs to be healed. The healing in Buddhism is established by the Buddha's discovery of the four noble truths; (1) there is suffering (2) cause of suffering is desire (3) cease desiring and you will cease suffering and (4) the eightfold path leads to the cessation of suffering. The eightfold path is a series of eight beliefs about the spiritually sustainable ways of life from belief and speech to mindfulness and meditation (Markham 2009a, b). Applying this thinking to the concerns of healthcare, Ian S. Markham in *A World Religions Reader* reveals the doctor as the symbolic embodiment of the Buddha; one who has achieved wisdom and enlightenment. A medical professional's prescription is a specific Dharma, or religious teaching, which can transform people's lives and thus treat the mind of the sufferer in the midst of the Sangha,

the community of believers that provides the setting for healing (Markham 2009a, b). The Buddhist practice of healing includes living the middle path, practicing the eightfold path and also meditative and tantra practices. Tantric practices, which developed later in Buddhism as well as Hinduism, are comprised of four levels which move from outer ritual action through meditation to complete spiritual attainment. The tantras added many ritual methods together with profound and difficult yoga or meditative practices and techniques (Jones 2000). Ultimately, the aim of a Buddhist is to attain Nirvana (enlightenment), where one sees reality as it is without any interference (Markham 2009a, b).

Judaism, which originated in the Middle East nearly 4000 years ago, also has a long tradition in the practice of and focuses on healing (Bronstein 2000). Speaking of the medicinal influence that the spiritual leaders held, rabbis were known for their healing skills. Later on, this belief was transcended into the occupations of the Jewish people, a coincidence brought about during the medieval period in Europe, as medicine remained one of the few occupations Jewish people were not turned away from (Allan 2001). The three leading documents that govern Jewish medicine are the Bible, the Talmud and the Kabbalah. Of the three documents, the Bible seems to be the most analogous to scientific medicine. For example, in the Talmud, the concern with modern medicine is simply incidental to the attempts to interpret the law. The Kabbalah, on the other hand, is filled with mysticism and magic, making its use a medical source quite limited. The reliance on such spiritual sources reflects the fact that disease and illness at this time was considered evidence of God's fury. As a result, these books describe healing through prayer, burnt offerings and sacrifices (Miller 1937).

Christianity is founded on the nearly 2000-year-old miraculous occurrence of Jesus of Nazareth rising from the dead after crucifixion. He is the incarnation of the triune God and worshiped by Christians as our Lord and Savior (Markham 2009a, b). Interestingly, the Christian teachings show that Jesus was widely viewed as a healer (Allan 2001). The New Testament reveals many instances where healing was obtained through casting out evil spirits from possessed individuals. The various healings in Christianity practiced by Jesus, portrayed in the Bible, and used by practitioners through the ages include exorcism, prayer from a distance and mystical acts or gestures. Lastly, in Christianity, a unitary view of the individual is taken: the body and spirit are one, not separate. Thus, many people were led to believe that the disease affecting the body spirit was curable by spiritual means (Hankoff 1992).

Islam, the religion of the Muslims, originated from the teachings of the Prophet Muhammad (570–632 B.C.E) who was handed the Quran (speech of God) by Allah (Aasi 2000). In the early Islamic period, the belief was that for every illness or problem, Allah had appointed a specific treatment or solution. According to the teachings of Prophet Muhammad, the three most common methods of treatment were: administration of honey, cupping and cautery. These methods came to be known as “Prophet Medicine” (Shanks and Al-Kalai 1984). Ultimately, what is thought to be the final authority on medical matters for many years is the *al-Qanun fi'l tibb* (The Canon of Medicine) by Ibn Sina (Avicenna). He combined diet, drugs, physical and psychological factors to treat patients and thereby contributing greatly to the interdisciplinary philosophy of medicine (Majeed 2005).

Dimensions of Religiosity

It has been a major challenge to uniquely define religiosity and spirituality, as these terms are considered interrelated and thus have many overlaps. Though individuals report that they are spiritual rather than religious (Roof and Greer 1993), a majority cannot

differentiate between religiosity and spirituality. After countless attempts, it was later on realized that religion and spirituality cannot be defined in a single sentence. Due to a lack of clarity, the difficulty in testing and measuring the effect of religiosity and spirituality on health outcomes becomes even greater. Though we may have reached a broader sense of these two terms, the unique and complex nature of medical studies have resulted in the generation of key characteristics or key terms associated with each term. One of the recent studies confirm the multi-dimensional nature of both religiosity and spirituality (Fetzer institute/NIA 1997), identifying eight domains to measure religiosity and spirituality, including public and private religious practices, social support, commitment, forgiveness, daily spiritual experience, religious coping, beliefs and values, and overall self-ranking. Even more intricate, Hill et al. (2000) found 125 measures of religiosity.

These two terms are affected by both society's and one's intimate beliefs, truly becoming integrative terms. Religion was referred to as "Cultural systems" by Clifford Geertz (1993), and later mid-twentieth century anthropologist Talal Asad characterized religion as an anthropological category (Asad 1993). Similarly, spirituality was defined as the deepest values and meanings by which people live (Sheldrake 2009). Further compilation revealed various broad characteristics of the two distinct terms, thus aiding the evaluation of the overall health of patients. This was accomplished through concept analysis, tracking the evolution of our ability to define these two terms. Spirituality was ultimately characterized as a transcendent quality closely influencing one's personal decisions, including those concerning one's health. Furthermore, one's sense of spirituality directly correlated with an inner trust in a sense of well-being, and more accurately a driving force toward a sense of purpose. Spirituality represents a step outside of the realm of institutional religion, which ultimately provides a framework for the development of one's faith through more concrete means, such as religious ceremonies or documents upholding the core beliefs of one's faith (Emblen 1992).

Several studies have been done to measure the relationship of religiosity and spirituality with health outcomes. While an overwhelming amount of studies reveal better health outcomes in those with religious beliefs, a few contradictory studies have shown negative or no benefits. It was later realized that these diverging outcomes are due to the ill-defined terms of religiosity and spirituality, as well as the limitations of measurement tools. For example, Matthew Feinstein and others evaluated 5474 individuals of white, black, and Hispanic and Chinese ethnicities in the National Heart, Lung, and Blood Institute's Multi-Ethnic Study of Atherosclerosis (MESA). After adjusting the demographic variable and comparing cross-sectional difference in cardiac risk factors and subclinical cerebrovascular disease (CVD), in addition to longitudinal follow-up for a period of 4 years, they could not find any association between greater religiosity and better health status, directly opposing the results proclaimed by previous studies (Gupta 1996; Gupta et al. 1997; Goldbourt et al. 1993; Colantonio et al. 1993).

Mechanisms of Spiritual Healing

Numerous medical findings suggest that religiosity and spirituality are directly related to better health outcomes, long survival, life satisfaction and happiness (Greeley and Hout 2006; Haslam et al. 2009; Ironson et al. 2002; Hummer et al. 1999). However, the mechanism by which religion brings about such changes remains a debatable mystery. A large number of studies have been done in search of some concrete conclusion, or at least a general phenomenon to point to as the origin of such beneficial health effects. Some researchers suggest that the effect of spiritual healing is comparable if not identical to

placebo effect (Kohls et al. 2011; Andrade and Radhakrishnan 2009; Levin 1996), while other studies have led to a number of potential mechanisms.

One such factor may be the psychological optimism that patients grasp onto after being diagnosed with a serious illness, which is thus strengthened through religious practices and spiritual beliefs. A longitudinal study over 4 years found that in a sample of 100 HIV patients, 45 % showed a substantial increase in religiosity after diagnosis of the disease ($p < 0.01$) (Ironson et al. 2006). Given the debilitating characteristics of such a disease, certain psychological characteristics such as optimism and a sense of purpose are heavily relied on. In another study evaluating 138 refugees from Kosovo and Bosnia, it was found that optimism was positively related to religious coping, which in turn was associated with an exponential increase in religiosity (Ai et al. 2003). Similarly, it was found that among 132 patients admitted for patient care and rehabilitation after stroke, various fortifying religious beliefs enhanced the patients' recovery (Giaquinto et al. 2007). Ultimately, these findings may be in part due to the tendency for spiritual people to maintain an optimistic attitude toward life and an even more stubborn outlook during times of serious illness. Religiosity thus assists one in overcoming the fear and helplessness one feels during such a time of illness, instead focusing on an innate sense of hope and determination (Koenig et al. 2001).

Another possible mechanism leading to health promotion could be lifestyle modification implemented by a religious person. It has been well established that smoking, alcoholism and substance abuse are inversely related to religiousness (Hasanovic and Pajevic 2010; Koenig et al. 2001; Michalak et al. 2007). By employing the Harvard trauma questionnaire (HTQ), Hopkins Check Scale SBCL 25 and check list for alcohol misuse MAST, researchers were able to use the religious moral belief index to correlate PTSD, anxiety, depression and alcohol misuse in 152 war veterans, which ultimately resulted in a negative correlation of Moral belief index with Tobacco and Alcohol misuse (Pearson's $r = -0.227$, $p = 0.011$; $r = -0.371$, $p < 0.001$, respectively) (Hasanovic and Pajevic 2010). A similar qualifying study also found similar results, further supporting the inverse relation of religiosity with substance abuse (Kendler et al. 2003). It seems that as one relies more on spiritual means toward assuaging fear and pain, they are less likely to rely on commonly harmful methods, such as substance abuse.

Many studies also support the conclusion that religious people tend to have a lower chance of engaging in potentially risky sexual behavior, thus becoming less likely to contract a sexually transmitted disease or HIV (Holder et al. 2000; Liebowitz et al. 1999; McCree et al. 2003). Edwards et al. (2008) studied the effect of religiosity on sexual behavior among 570 Latino/Latina Adolescents from the 2002 *National Survey of Family Growth*, which ultimately led to the conclusion that increased religiosity and attendance to church was associated with decreased risky sexual behavior, fewer lifetime sexual partners and a later age of sexual debut. However, because participants in this study were mostly Mexican and Hispanic, greater research is needed to assess this trend across various ethnicities and parts of the globe.

Outside of an individual experience, a religious person forms social support networks through religious service attendance, posing as yet another potential vehicle for the improvement of health. Lim and Putnam (2010) suggested that this social network built within congregations, originating from religious services, is what enables such a positive outlook. They observed that 28.2 % people, influenced by the high frequency of religious service attendance, are extremely satisfied with their lives. In comparison, among those who never attended religious services, 19.6 % are extremely satisfied. This finding suggests that life satisfaction is enhanced through communal prayer, rather than praying alone

(Lim and Putnam 2010). It clearly suggests that along with other factors, the social network built during religious service attendance plays a prominent role.

Similarly, researchers studied effect of religiosity and spirituality on long-term survival among 166 patients who were suffering from end-stage renal disease (ESRD) and were being treated with hemodialysis. They found that only age and social support were associated with survival when controlling for diabetes, HIV and albumin concentration (Spinale et al. 2008). These data indicate that the effects of spirituality may be mediated by social support, rather than a religious medium. However, the sample size for this study was small, and due to the multifaceted nature of this concept, a broader study must be conducted.

A last possible mediator for the beneficial effects observed in religious people could be the increased expression of one's own positive emotions (forgiveness, love, feeling of peace) (Kaplan et al. 1993) in conjunction with decreased expression of negative emotions (fear, anxiety, depression) (Diwan et al. 2004). Studies show that this induction of positive affect may lead to hormonal changes like alteration in level of cortisol, growth hormone and prolactin, and regulation of the autonomic nervous system involving central nervous system and peripheral nervous system (CNS and PNS). In terms of clinical importance, decreased glucocorticoid may help to improve immunological function, wound healing and fighting infections. Furthermore, the decrease in presence of catecholamines (epinephrine and norepinephrine) may lead to a decrease in both heart rate and blood pressure, and may prevent organ damage. Many studies have been conducted so far but no clear conclusion has been drawn, as there are several inconsistencies in the result of studies. Some studies found decrease in levels of cortisol, epinephrine or norepinephrine with positive affect (Berk et al. 1989; Buchanan et al. 1999; Codispoti et al. 2003; Cohen et al. 2003; McCraty et al. 1998; Smyth et al. 1998), while few studies have opposite results (Hucklebridge et al. 2000; Futterman et al. 1994; Hubert et al. 1993) or even no changes with either positive or negative affect (Ryff et al. 2004; Van Eck et al. 1996). Therefore, these results should be interpreted with caution, warranting further studies as a challenging and novel opportunity for researchers.

Interestingly, one article asserted that current research regarding spiritual and religious effects on health are so multi-faceted that future research should instead be focused on other elements (Andrade and Radhakrishnan 2009), such as atheism. Rather than a set of beliefs, atheism can be considered a way to look at the world, a different perspective that focuses on a concept known as "positive atheism" (Whitley 2010). An adherent of positive atheism holds firm to their belief that there are no deities, whether they are labeled as "gods" or otherwise. This concept and its relation to health need to be better and more efficiently evaluated, especially in terms of its effect on psychological and physical outcomes.

In regards to meditation, Wachholtz and Pargament (2005) found that spiritual meditation, or meditation that focused on inner values and beliefs by repeating a phrase involving the word "God" proved more effective than secular meditation in terms of health benefits, such as relative psychological outlook on one's circumstances, relaxation and response to pain. The secular meditation phrase focused on "I" rather than "God." In the study, patients were instructed to perform a 20-min meditation technique (repeating a phrase either focused on "God" or "I") every day for a period of 2 weeks, with each group's meditation subject to various changes, such as the addition of spiritual characteristics and beliefs for spiritual meditation, or an increased focus on bodily relaxation for secular meditation. In order to test the durability and utility of both meditations, patients would place their hands in a bath of 2 °C water, with the researchers measuring the amount

of time each of the 84 participants could withstand, and after they took their hand out of the water, they continued with meditation. Also, heart rate was measured before, during, and after the trial. Using least significant differences methodology, it was found that Spiritual Meditation Group had a stronger feeling of optimism and less anxiety as compared to the Relaxation and Secular Meditation Groups. In regards to the cold water trial, Spiritual Meditators held their hands in the water significantly longer than either of the Relaxation and Secular Meditation Groups (Wachholtz and Pargament 2005). However, as compared to a control group, both Secular Meditation and Relaxation groups had better cardiac outcomes and psychological health, leading us to conclude that there still exists a health benefit for atheists as well.

Neurological Effects of Spirituality and Religiosity

Applying a neurological perspective to this health-related phenomena, researchers have evaluated the immediate physiological changes in the brain that precede later health benefits. The neurophysiological effects of prayer, guided by religious practices, beliefs, and common religious doctrine, can be monitored through regional brain activity, the activity of one's neurotransmitters, as well as cerebral blood flow. Physical representations of these biological processes are best seen through EEG, PET, and MRI scanning, allowing the individual to be in his or her own control. Throughout these trials, the patient will take part in one activity bereft of any spiritual connotations, and later perform a specific spiritual practice, be it prayer or theological meditation. It is a hope that through evaluating the cognitive effects of prayer, we will be able to better understand just how the largely beneficial health changes come about. Specifically, a new field of research referred to as neurotheology dedicates its efforts to evaluating this precise and dynamic relationship between the physiological changes of the brain during spiritual practice (Newberg 2014).

Neurotheology is an interdisciplinary field that attempts to connect seemingly opposing fields of spirituality and neuroscience in its explanation of spiritual experiences, which can be further utilized to delve into the mystery of derived health benefits. The practices of prayer and meditation have become the chief observable characteristics of a patient in an active spiritual state, as when a body engages in prayer or meditation, a noticeable physical response is recorded in the brain. Utilizing single-photon emission computed tomography, or SPECT images, Newberg studied the alteration in rate of blood flow in the brains of three Franciscan nuns as they prayed. The nuns performed a special type of prayer called "centering prayer" (Newberg et al. 2003), where a specific phrase from the Bible is verbally repeated. The researchers allowed the nuns to prepare themselves for meditation for ten minutes, thus providing a baseline to compare later SPECT images. The nuns were also injected with 260 MBq (Megabecquerel) of HMPAO (hexamethyl propylenamine oxime), or Technetium (99mTc) exametazime, via an intravenous line used to detect the change in blood flow. Interestingly, during the subsequent forty minutes of recorded spiritual practice, during which 925 MBq of HMPAO was injected, the blood flow decreased in an area referred to as the "orientation area" (Newberg 2011). This area in the temporal lobe enables humans to construct an image of their surroundings as well as themselves (Newberg 2011). The researchers had hypothesized that decreased blood flow would account for the lack of awareness of self during prayer, which proved to be correct in this experiment (Newberg et al. 2003). In support of this result of testing, psychologist Craig Aaen-Stockdale indicates in his article that past research "has singled out the temporal lobe as a potential locus for mystical experiences and religious feelings" (Aaen-Stockdale 2012; Mishra et al. 2012).

In an experiment performed by Eileen Luders and other researchers in the UCLA Laboratory of Neuro Imaging, researchers chose to explore the connection that exists within meditators between brain physiology, specifically concerning the hippocampus, and the spiritual practice of meditation. This experiment included thirty meditators and thirty non-meditators, with an equal proportion of men and women. In order to specify the regions of the hippocampus that would be studied for difference in width, researchers used a specific diagram called a hippocampal mesh, which is a “gridded surface of equally spaced points” (Luders et al. 2013). This mesh allowed researchers to view the “regional variations in surface morphology” (Luders et al. 2013). Therefore, the researchers would be able to record the results in a more narrow and specific realm. Each succinct representation of the hippocampus region would then also contain a medial curve. The distance measured from the medial curve to a point on the hippocampus mesh would help establish the precise volume of each patient’s hippocampus. Ultimately, after this imaging process was repeated to ensure validity, it was found that mediators had a greater measured distance from medial curve to point (Luders et al. 2013). Consequently, this research connects the ability to perceive in meditation, viewed as an ephemeral quality, and the resulting brain function that supports it. The physical enlargement of the hippocampus in meditators can further inspire researchers, as this practice affected brain volume as well as employed mental perception. Though these results are limited in scope and require further investigation, locating a cortical region as the potential physical correspondent to spiritual practices may give researchers another clue as to just how spirituality and religiosity mediate such astonishing health benefits.

Role of Religiosity and Spirituality in Health Care

Despite contrary studies, religiosity and spirituality have been met with a majority of approval as beneficial in health care. Noticeably, it has been observed that more papers showing positive effects of religiosity and spirituality are being published in comparison with those which show negative or no association with health outcomes, reflecting the more common stance that religiosity does provide aid for one’s bodily health. Though favorable for the hopeful patient, this tendency may lead to publication bias, so studies should be interpreted with care, allowing religiosity and spirituality to play a cautionary role in health care. In our review, numerous studies exhibited the various health-promoting and disease-preventing effects that are the result of religiosity and spirituality. Further implementation of religious practices in a patient’s life may also include integral meditation and spiritual prayer, both of which are included under “Mind and Body Medicine” subcategory of CAM (“Complementary, Alternative, or Integrative Health: What’s In a Name?”, 2008). Complementary Alternative Medicine (CAM) is being widely used through the world. According to the report by National Health Statistics report #12, some form of CAM was used by 38 % of adults and 12 % of children in 2007 (Barnes et al. 2008).

High blood pressure is the most common chronic medical problem throughout the world, prompting a high volume of visits to primary healthcare providers. The American Heart Association estimated the direct and indirect costs of high blood pressure in 2010 as \$76.6 billion (Lloyd-Jones et al. 2010). Its prevalence is due in part to the wide variety of risk factors that can easily lead to hypertension, ranging from one’s own ethnicity and age to external circumstances, such as a stressful environment (Nakanishi et al. 1998; Skarfors et al. 1991).

Interested in the effect of religiosity in relation to blood pressure, a study was conducted on 112 females of Judeo-Christian faith who were at least 35 years of age (Hixson et al. 1998). Blood pressure was measured by using an automatic sphygmomanometer monitor (Colins STBP-780) which was identical for all subjects. Variables which can affect blood pressure were also determined. To assure accuracy, these variables such as physical activity, $\text{Na}^+/\text{K}^+/\text{Ca}^{2+}$ intake, smoking and alcohol intake, weight and height were all subject to control hours prior to measurement in the hopes of an accurate reading (Iyriboz and Hearon 1992; Frohlich et al. 1987). Religiosity was measured by using a 33 question multidimensional religiosity schedule constructed on the basis of nine dimensions, ranging from internal religiosity to organized religious activity. Thus, both the more external factor of religion and the internal belief of one's spirituality were taken into account. In addition, multiple regression path analyses were conducted to determine the direct and indirect effect of religiosity on BP with age, and BMI was controlled statistically. For systolic and diastolic blood pressures, path analyses were constructed for each of nine dimensions of religiosity and for the total religiosity score. Researchers found that the strongest effects were seen for intrinsic religiosity (total effect, -0.218), religious coping (total effect, -0.193), religious total (total effect, -0.166), religious experiences (total effect, -0.157), extrinsic religiosity (total effect, -0.150), religious well-being (total effect, -0.143) and belief factor (total effect, -0.140) all on diastolic blood pressure. These observations showed that effect of religiosity was greater on diastolic blood pressure (DBP) as compared to systolic blood pressure (SBP) for an unknown reason, and the direct effect of religiosity was found to have greater effect on both DBP and SBP as compared to the total indirect effect.

The relationship between religious service attendance and hypertension was investigated through a study performed by Frank Gillum (Gillum and Ingram 2006) on 14,475 American men and women aged 20 years and over from the Third National Health and Nutrition Examination Survey (NHANES III). Information regarding frequency of religious service attendance and history of hypertension was obtained and their blood pressure was measured. After controlling socioeconomic and health variables, they found that compared to never attenders, those attending religious services weekly had a systolic BP 1.46 mmHg lower (95 % CL 2.33, 0.58 mm Hg, $p < 0.01$) and those attending religious services more than weekly has systolic BP 3.03 mm Hg lower (95 % CL 4.34, 1.72 mmHg, $p < 0.01$). Similarly, 223 participants (104 males and 119 females) between the ages of 18–75 years were selected from both Sunni and Shiite subgroups of Muslim society in order to evaluate the effect of religious commitment on blood pressure when other sociocultural variables are taken into account. After controlling these sociocultural variables, religious commitment had statistically significant blood pressure-lowering effect, both on systolic blood pressure ($B = -0.49$, $\beta = -0.092$, t value = -1.45 ; $p < 0.05$) and diastolic blood pressure ($B = -0.663$, $\beta = -0.154$, t value = -2.17 ; $p < 0.05$)⁷⁵. Accenting this study, researchers later found a constant inverse relationship between religiosity/spirituality and hypertension (Tartaro et al. 2005; Larson et al. 1989), qualifying the previous conclusion that religious practices can result in greater cardiovascular health.

One of the most prevalent of psychological illnesses, depression is a major psychological cause of morbidity worldwide, though lifetime prevalence varies widely, as it spans the range of 3 % in Japan to 17 % in the USA (World Health Organization 2001; Andrade et al. 2003; Kessler et al. 2003). In terms of progression of disease, people are most likely to suffer their first depressive episode between the ages of 30 and 40, and there is a second, smaller peak of incidence between ages 50 and 60 (Eaton et al. 1997). In light of these

facts, researchers performed a study to determine the multidimensional nature of religiosity and effects of these dimensions on psychiatric illness and substance abuse (Kendler et al. 2003). Sending questionnaires to all selected participants ($N = 7230$), they received responses from 2621 participants (36.3 %). Clinical interviewers assessed psychiatric illness and substance use disorders by using an adaptation of *Structured Clinical Interview for DSM-III-R* (Spitzer et al. 1992) and DSM-III-R with six modifications. Dimensions for religiosity were figured by responses to 78 items assessing various aspects of religiosity. They ultimately figured seven dimensions of religiosity, including General religiosity, Social religiosity, Involved God, Forgiveness, God as Judge, Un-vengefulness, and Thankfulness. They divided major depression, generalized anxiety disorder, phobia, panic disorder, and bulimia nervosa as internalizing disorders and nicotine dependence, alcohol dependence, drug abuse or dependence, and adult antisocial behavior as externalizing disorders. Furthermore, researchers found reduced risk of internalizing disorders with three factors (Social religiosity, Thankfulness and un-vengefulness.) and reduced risk of externalizing disorders with six factors (Social religiosity, Thankfulness, General religiosity, Involved God, Forgiveness and God as judge). These factors directly correlate with religious behavior and attendance, thus bolstering the possibility of religion benefiting not only one's bodily but mental state. Due to its prevalence in such a debilitating illness, breast cancer in patients often lead to the onset of depression, leading researchers to measure its prevalence through the Center for Epidemiologic Studies Depression Scale (Aukst-Margetić et al. 2005). They found that high religiosity was associated with significantly lower prevalence of depression ($\chi^2 = 6.635$; $df = 2$; $p = 0.036$). Several other studies have shown protective effect of religiosity on development of depression (Miller and Gur 2002; Kilbourne et al. 2009) or remission (Koenig 2007).

There is then also a question of the health state of not only a person directly affected by mental illness, but also the individuals who inhabit the same environment of that person. One study researched the effect of religiosity on the 114 adult offspring of depressed and non-depressed parents (Miller et al. 2012). Participants with depressed parents were categorized as high-risk group and those without depressed parents as low-risk group. Three religiosity measures assessed were personal importance of religiosity/spirituality, frequency of attendance at religious services, and denomination (all participants were either Catholic or Protestant). Participants were followed longitudinally from 10 to 20 years. Researchers found that offspring who reported at year 10 that religiosity in highly important in their life had one-fourth of the risk of developing depression between ages 10–20 compared with other participants (odds ratio 0.24, 95 % CI 0.06–0.95, $p = 0.04$). Also in the high-risk group, participants with high personal importance of religiosity/spirituality had about 1/10th the risk of having an attack of major depression between 10 and 20 years as compared to those who did not report religiosity/spirituality as highly important in their life (odds ratio 0.09; 95 % CI 0.01–0.82; $p = 0.03$). In high-risk group having previous attack of depression, among those who reported religiosity/spirituality important in their lives, only 9 % (1 out of 11) had an attack of major depression as compared to 50 % (12 out of 24) among those who did not report religiosity/spirituality as important.

AIDS is one of the most common causes of mortality and morbidity in the world. Despite recent advances in access to the antiretroviral therapy across the world, the AIDS pandemic claimed an estimated 2.1 million lives in 2007 (2007 AIDS Epidemic Update, 2007). Globally, an estimated 33.2 million people lived with HIV in 2007. However, South Africa has the largest population of HIV patients in the world, followed by Nigeria and India (McNeil 2007).

Several studies have been done to figure out the mechanism by which religiosity exerts its protective effect in prevention of AIDS and remission in AIDS patients. It appears that religiosity provides protection against HIV by promoting healthy practices and avoiding hazardous health behavior, such as potentially risky sexual practices and IV drug abuse (Billieux et al. 2014; Gillum and Holt 2010). In order to analyze the connection between the effects of religiosity on HIV patients, a randomized control trial was performed (Bormann et al. 2009). Patients were divided into intervention ($n = 36$) and control groups ($n = 35$). In intervention groups, participants were taught by lectures, discussion and home assignments to use Mantram (traditional practice of repeating a spiritual word or phrase) (Bormann and Oman 2007; Oman and Driskell 2003) to manage stressors through a spiritual means. The use of Chi-square and t tests made it sure that there were no differences in demographics or health status between the two groups at pre-intervention. They were encouraged to engage in Mantram as much as possible, especially in non-stressful conditions like before going to sleep or while waiting in lines in order to increase frequency of use. Control groups watched video tapes related to HIV treatment issues, nutrition, wasting syndrome and medications. Following video tapes, group discussion was organized yet bereft of any instruction on stress management or coping skills. Faith was measured by FACIT-SpEx version 4 (Brady et al. 1999; Peterman et al. 2002), while saliva cortisol was measured by radioimmunoassay. It has been well documented that decreased level of cortisol leads to improvement in Immunity and CD4+ count in HIV patients (Corley 1996) thus leading to the data collected regarding cortisol levels. Participants were asked to collect four samples of saliva just before study meetings in pre-intervention, post-intervention and follow-up periods. Researchers noticed increased faith and decreased cortisol level from pre- to post-intervention period, as well as some decrease in the cortisol level observed in follow-up period.

In an alternate study, the religious evolution of 100 HIV patients was investigated over a period of 4 years (Ironson et al. 2006). Participants were interviewed, completed a questionnaire and had blood drawn every 6 months during a time span of 4 years, reflected in hierarchical linear modeling (HLM) (Raudenbush and Bryk 2002). The increase in religiosity and spirituality after the diagnosis of HIV was significantly related to change in CD4+ count over 4 years ($t = 3.03, p = 0.004$) as well as the change in viral load (log) over 4 years ($t = -2.94, p = 0.005$). Remarkably, for every unit of increase in spirituality, there was preservation of 1.39 CD4 cells per month, while those who became less religious lost CD4 cells 4.5 times faster as compared to those who became more religious/spiritual. Furthermore, the increase in religiosity was associated with better control of viral load. These findings support role of religiosity in retarding the progression of AIDS, apart from its protective effect from contracting disease as we discussed earlier.

Resulting from a plethora of interpersonal factors, suicide has contributed to the fatalities of over one million people each year. The World Health Organization (WHO) estimates that it is the 13th leading cause of death worldwide, and the National Safety Council rates it sixth in the USA (Gross 2006; National Safety Council). Evaluation of the relation of religiosity with suicide in adult males in Utah was accomplished through gathering data from the Utah state department of health, US Census Bureau and the Latter-Day saints (LDS) church (Hilton et al. 2002). Members of the church were categorized as active (high religious commitment) and less-active (low religious commitment), while suicide rates between members and non-members were determined from sources stated above. From the data, it was found that suicide was more frequent in non-members of the Church, bereft of any spiritual guidance or societal connections with the faith community. Using active LDS as reference group, the less-active group was found to have relative risk

of suicide ranging from 3.28 (15–19 years) to 7.64 (25–29 years) and non-members had relative risk of suicide ranging from 3.43 (15–19 years) to 6.27 (20–24 years). Although mechanism was unclear, it was similarly concluded that high levels of religiosity were inversely related to suicide. Using data from 1993 National Mortality follow-back survey, researchers were able to compare the religious participation in 584 suicides to those of 4279 natural deaths occurring among men and women ages 50 and more (Nisbet et al. 2000). They found that possibility of those having never participated in religious activity was greater in suicide victims as compared to natural deaths after controlling for age, sex, race, marital status and social contact. These findings are further supported by numerous studies, showcasing the life-saving capabilities of spirituality (Stack and Kposowa 2011; Breault and Barkey 1982; Stark et al. 1983).

Coronary artery disease (CAD), another common cause of mortality, has many risk factors including smoking, unrelieved stress, hypertension, diabetes and high blood cholesterol (“The Top 10 Causes of Death”; “Coronary Artery Disease”). Fortunately, it has been shown that religiosity has a protective effect on smoking (Koenig et al. 1998; Ai et al. 2003; Koenig et al. 2001; Giaquinto et al. 2007), and hypertension (Hixson et al. 1998; Gillum and Ingram 2006; Al-Kandari 2003; Tartaro et al. 2005; Larson et al. 1989) within most individuals. Most pertinently, studies have revealed that religiosity and spirituality retard progression of CAD (Morris 2000). Participants were also a part of a study (Ornish et al. 1990) which assessed the effect of lifestyle modification on progression of CAD in those same patients by measuring percentage of coronary artery obstruction at 1 and 4 years of study. In the current study, patients were divided in control ($n = 6$) and experimental groups ($n = 8$). Spirituality was measured by Spiritual Orientation Inventory (SOI) (Elkins et al. 1988). Mean score on SOI was 382 for control group and 474 for experimental group, with the experimental group leading in spirituality. It was found that participants having low SOI scores tended to have progression of their coronary artery obstruction and those having high SOI tended to have regression of coronary artery obstruction. Lastly, clinicians were interested in the discrepancy in prevalence of smoking, total blood cholesterol, triglycerides and low density lipoprotein between secular patients and the Orthodox Jewish population (Friedlander et al. 1985). This study showed difference in lifestyle and eating habits among religious and non-religious people, both possible mechanisms which could have led to these findings. This research endeavor reveals how religiosity results in better health outcomes partially by bringing a dynamic change in lifestyle, a finding similarly suggested by Fraser (1988).

As a result of the interconnected relationship between mind and body that many of the world’s major religions have fostered, religiosity is associated with mental and physical well-being as well as improved quality of life. Various studies have shown that religious/spiritual people have increased sense happiness (Zullig et al. 2006; Ferris 2002; French and Joseph 1999; Francis et al. 2004; Abdel-Khalek and Lester 2009), and they enjoy a longer life (Oman and Reed 1998; Chida et al. 2009; Lucchetti et al. 2011; Gillum et al. 2008) as compared to non-religious people. Researchers sought to find out association of self-reported religious attendance and subsequent mortality over 5 years for 1931 older residents of Marin County, California, where six confounders were taken into account (Morris 2000). These confounders were demographics (age, sex and marital status), presence of chronic diseases, physical functioning, Health characteristics (exercise, smoking, alcohol intake and underweight), social functioning and support and depression. After controlling these confounders, they found that religious attendance was clearly associated with decreased mortality.

Religiosity and spirituality are also associated with increased quality of life in ill patients, as demonstrated by numerous studies (Bartlett et al. 2003; Krupski et al. 2006; Finkelstein et al. 2007; Harrison et al. 2005). It was discovered that religiosity was associated with positive affect and higher health perceptions in patients with rheumatoid arthritis (Bartlett et al. 2003). Similarly, increased quality of life was demonstrated in prostate cancer patients (Krupski et al. 2006) and in end-stage renal disease (ESRD) patients (Finkelstein et al. 2007). In the sample of 50 Sickle cell disease (SCD) patients, church attendance was significantly associated with lowest scores on pain measures after controlling for age, gender and disease severity (Harrison et al. 2005). These findings clearly point out toward role of religiosity/spirituality in improving quality of life among the healthy and diseased individuals.

Discussion

Studies striving to make known the vital element of religiosity/spirituality in patient care are being conducted across the globe, as its role in health care is being more and more rapidly recognized by healthcare professionals. This study brings to the light the utility of religiosity and spirituality in prevention of many disorders and improving overall quality of life. However, these studies have certain shortcomings which reflect gaps in the research and limitation of measurement tools available in the studies. These are the challenges which must be rectified in future studies, thus providing opportunity for researchers to explore this field of great interest.

The goal of this review paper was to evaluate the credibility of the religiosity/spirituality as protective factors in various health disorders and to discuss the mechanism by which religiosity enacts such a phenomenal effect. However, many of the trials we discussed, which were not double blind in design, had limitations in their study, resulting from the lack of clarity in defining boundaries and factors that comprise religiosity, to the effectiveness of tools used to measure such an occurrence. Until these flaws in design are overcome, no conclusion can be drawn. In order to move forward in the hopes of better understanding the role of religiosity and the mechanism it works through, it is imperative to discuss the shortcomings so as to provide direction for the future studies.

Reflecting the varied societal and individual elements that comprise a religion, religiosity and spirituality are characteristically broad terms. The degree to which a person is religious may lead to the variation in the results, thus challenging the reliability of study. The first problem recognized with most of the studies was figuring how to measure the intricate dimensions of the religiosity which may affect the health outcomes. Among the various articles reviewed, only few articles effectively assessed the dimensions of religiosity in detail.

A previously mentioned study conducted by Hixson et al. (1998) demonstrated inverse relation of Religiosity with blood pressure in females of Judeo-Christian faith. However, all participants were between 35 and 80 years of age and belonged to middle or upper socioeconomic families. Hence, the findings may not be applicable beyond this specific cohort. A larger sample size with participants from all socioeconomic classes is now recommended for future studies. Moreover, the cross-sectional design of the study limits its capability to determine the direction of causality in the observed relationship between independent variables and blood pressure. Longitudinal studies should be used to achieve this goal. Furthermore, participants who were on blood pressure medications were not

included in path analysis due to complexity in measuring their unmatched blood pressure. Exclusion of these individuals may lead to difference in the relationship between religiosity and blood pressure.

Another promising study by Kendler et al. (2003) demonstrated decreased prevalence of psychiatric illness and substance abuse in more religious participants. However, they did not address the causal nature of the reported association. It is possible that experience of illness may have changed the religiosity or any third factor may have altered both religiosity and illness. A longitudinal study may be performed here to rectify this drawback. In addition, rare diseases like bulimia nervosa, panic disorders and adult antisocial behavior were examined and other disorders like schizophrenia, bulimia nervosa and bipolar disorders and their association with religiosity was not assessed. Also, the sample consisted of white male and females born in Virginia, so the findings may not be generalized in other populations or ethnicities. A study which includes participants from other populations and races would lead to better assessment.

Bormann et al. (2009) studied effect of Mantram intervention in HIV patients and discovered an inverse association with cortisol levels, thus predicting better immunity in the patients. However, sample size of this study was small so findings may not be generalized. Furthermore, dropout rate in this study was 30 % which may lead to selection bias, as the cortisol level in the dropout participants could not be determined. A large-scale study with mortality and morbidity outcome measures need to be performed to determine whether Mantram repetition intervention is replicable and clinically relevant.

Another study done by Ironson et al. (2006) demonstrated decrease in viral load and increase CD4+ counts with increased religiosity. However, it may be possible that the steady maintenance of better health may lead to an increase in religiosity/spirituality, thus reversing the relationship which was presupposed. Also, change in religiosity/spirituality was measured retrospectively which may introduce potential bias. Longitudinal studies with periodic measurement of religiosity/spirituality and health status may overcome this problem. Another drawback in the study design was that changes in the religiosity/spirituality were measured by a single item containing five options. More accurate methods for measuring changes in religiosity/spirituality should be employed. Further generalizability of the study is questionable as samples were chosen in the middle of the disease, and it is quite possible that psychosocial variables affected the disease in this range. Finally, this study failed to address the increase in spirituality and quality of life.

Despite many shortcomings, the majority of these studies are united in their ability to highlight the undeniable role that religiosity has on patient health wellness and diseases—in other words, it cannot be ignored. This fact has been particularly held in earnest interest by researchers in the field of neurotheology, searching for the physiological changes that correspond with certain health outcomes, specifically with spiritual practices. Given the potential impact of spirituality in health outcomes, physicians should be able to address the religious concerns of the patients in addition to normal clinical concerns. This sentiment has been echoed through the past national conference titled *Spiritual Dimensions in Clinical Research*, with Dr. Matthews introducing the conference by citing the historically intertwined relationship between spirituality and medicine, and, more recently, the physician's response to said relationship (Marwick 1995). Studies show that patients expect physicians to be able to address their religious concerns in addition to concerns relating primarily to the course of the disease or illness (Kristeller et al. 2005). The growing trend for utilizing prayer in order to assuage fear has grown throughout the years, as one particular study revealed that one-third of participants relied on prayer for comfort during illnesses. Though many participants of the same study did not acknowledge prayer

as a course of action to their physicians, this possible medium represents an avenue of greater communication between physician and patient (McCaffrey et al. 2004). Ultimately, this can help the physician in building rapport with the patient, thus reducing the anxiety and trepidation of the patient, which inadvertently enhances adherence with treatment regimen and follow-up.

Lastly, there is need of well-designed double-blind control studies in the future using major religious practices and spiritual beliefs in order to test the validity of present conclusions.

Conclusion

Our review of medical literature found that religiosity is multidimensional in nature and has a profound protective effect through the course of a disease. Not only does it hinder the onset of various diseases, but it also may slow down progression of untreatable diseases and enhance remission of treatable diseases. Religiosity has been found to have a great role in health promotion and disease prevention, in addition to its' defensive role against a number of diseases like hypertension, psychiatric illness, suicide, AIDS and several other diseases. In addition, it has an important role in the treatment of various physical and mental illnesses. Efforts have been made to find the exact role of religiosity in health care, yet require certain elements to assure validity and accuracy. For example, further longitudinal studies with randomization and blinding are required to establish the role of religiosity/spirituality in health care. Ultimately, the role of spirituality for an individual plays a vital, although still mysterious, role in healthcare, often used as a medium through which one' s physiological health is improved. In spite of positive effect of religiosity/spirituality in health and diseases, this effect needs to be further studied in a double-blind control study using larger sample size.

Compliance with Ethical Standards

Conflict of interest None.

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