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ORIGINAL PAPER

Islam, Assisted Reproduction, and the Bioethical Aftermath

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Abstract Assisted reproductive technologies (ARTs), including in vitro fertilization to overcome infertility, are now widely available across the Middle East. Islamic *fatwa*s emerging from the Sunni Islamic countries have permitted many ARTs, while prohibiting others. However, recent religious rulings emanating from Shia Muslim-dominant Iran have created unique avenues for infertile Muslim couples to obtain donor gametes through third-party reproductive assistance. The opening of Iran to gamete donation has had major impacts in Shia-dominant Lebanon and has led to so-called reproductive tourism of Sunni Muslim couples who are searching for donor gametes across national and international borders. This paper explores the "bioethical aftermath" of donor technologies in the Muslim Middle East. Other unexpected outcomes include new forms of sex selection and fetal "reduction." In general, assisted reproduction in the Muslim world has been a key site for understanding how emerging biomedical technologies are generating new Islamic bioethical discourses and local moral responses, as ARTs are used in novel and unexpected ways.

Keywords Islam · Sunni · Shia · Islamic bioethics · Assisted reproduction · Assisted reproductive technologies · Third-party reproductive assistance · Egg donation · Sperm donation · Sex selection · Fetal reduction · Iran · Lebanon

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Introduction

Since the 1980s, in vitro fertilization (IVF) and other forms of assisted reproductive technology (ART) have rapidly globalized, spreading into many parts of the Muslim world. This is due in large part to the enthusiastic reception of these technologies by Islamic religious authorities over the past 30 years. In this article, we intend to show how IVF and related ARTs emerged in the Muslim Middle East, leading to multiple social and cultural transformations in the reproductive lives of Muslims. Through this account of Islam and assisted reproduction, we hope to debunk the widespread Western myth of Islam as biomedically backward or anti-scientific. Far from it, Islam is a religion that can be said to encourage science and technology, including medical developments to overcome human suffering. Islam, as we will argue, is scientifically agentive, encouraging the pursuit of high-tech medicine and science. Indeed, the continual emergence of new ARTs has led to the concomitant emergence of interesting Islamic bioethical discourses on how these technologies should be appropriated and used by Muslim physicians and their patients.

Overall, the theme of this paper is *emergence*: the emergence of the ARTs themselves; the emergence of Islamic bioethical discourses surrounding ARTs; the emergence of an ART industry in the Muslim Middle East; the emergence of third-party reproductive assistance in the Shia-dominant countries of Iran and Lebanon; and finally, the emergence of what we will call the "bioethical aftermath," or a number of unanticipated and troubling consequences, which are presenting social and ethical challenges in the contemporary Muslim world.

Because we are both anthropologists, we base our article on long-term field research undertaken in IVF clinics in four Middle Eastern countries, including Egypt (Inhorn 2003), Lebanon (Inhorn 2012), the United Arab Emirates (Inhorn 2015), and Iran (Tremayne 2009, 2012). Together, we have traced the significant differences between the Sunni and Shia Muslim religious discourses surrounding the ARTs, particularly in the realm of third-party reproductive assistance (Inhorn and Tremayne 2012).

The Emergence of ARTs

In his seminal essay, "Dominant, Residual, and Emergent," social theorist Raymond Williams (1978) defined "emergence" as "new meanings and values, new practices, new relationships and kinds of relationship, which are continually being created" (p. 123). The term emergence has great relevance in the world of ARTs. Since the birth in 1978 of England's Louise Brown, the world's first "test-tube baby," there has been a veritable explosion of ARTs related to IVF. These include (1) intracytoplasmic sperm injection (ICSI) to overcome male infertility; (2) third-party reproductive assistance (with donor eggs, sperm, and embryos) to overcome problems of poor gamete quality; (3) gestational surrogacy to help women who are unable to carry a pregnancy in their own uterus; (4) cryopreservation (freezing) and storage of unused sperm, embryos, eggs, and now ovaries; (5) mitochondrial transfer from a healthy human egg to the diseased egg of another woman; (6) preimplantation genetic diagnosis (PGD) to determine whether embryos have genetic defects, to select embryos of a specific sex, or to select embryos that can grow into "savior siblings" through the donation of their umbilical cord blood; (7) human embryonic stem cell (hESC) research on unused embryos for the purposes of therapeutic intervention; and (8) the future possibility of human reproductive cloning, or asexual, autonomous

reproduction, which has already occurred in other mammals (e.g., Dolly the sheep) (Franklin 2007). With virtually all of these technologies, sperm and eggs are retrieved from bodies, embryos are returned to bodies, and sometimes they are donated to other bodies or used for the purposes of stem cell and other forms of medical research.

The Emergence of Sunni Islamic Bioethical Discourses

IVF globalized quickly, moving to the Middle East within 8 years of Louise Brown's birth. Today, the Middle East is host to a booming and high-tech ART industry (Inhorn and Patrizio 2015). Egypt alone boasts more than 50 IVF clinics, Iran has nearly 70 clinics, and Turkey has the largest number, with more than one hundred clinics. Even a small country such as the United Arab Emirates boasts more than a dozen IVF centers, including two supported by the Emirati state (Inhorn 2015).

The development of a Middle Eastern IVF industry is not surprising: Islam encourages the use of science and medicine as solutions to human suffering and is a religion that can be described as "pronatalist," encouraging the growth of an Islamic "multitude." Yet, relatively little is known about Islam and technoscience, if technoscience is defined broadly as the interconnectedness between science and technology. As noted by Mazyar Lotfalian (2004, p. 6) in his monograph on *Islam, Technoscientific Identities, and the Culture of Curiosity*, there is a glaring lacuna in the literature on science and technology in cross-cultural perspective, particularly from the Islamic world, where there are "really only two strains of relevant work"—one on the Islamic medieval sciences and one on philosophical arguments for a so-called clash of civilizations between science and technology in the Islamic and Western worlds. This dearth of relevant scholarship on Islamic technoscience clearly applies to the cross-cultural study of ARTs. For example, in the seminal volume on *Third Party Assisted Conception Across Cultures: Social, Legal and Ethical Perspectives* (Blyth and Landau 2004), not a single Muslim society is represented among the 13 country case studies.

IVF was actually first practiced in 1986 in the Sunni Muslim-majority countries of Egypt, Saudi Arabia, and Jordan. Egypt's early entrance into assisted reproduction was especially important from an Islamic standpoint (Inhorn 2003; Serour 2008). The Grand Shaykh of Egypt's renowned religious university, Al-Azhar, issued the first widely authoritative *fatwa* on assisted reproduction on March 23, 1980—only 2 years after the birth of the first IVF baby in England, but a full 6 years before the opening of Egypt's first IVF center.[1] Nearly 35 years later, this original Al-Azhar *fatwa* has proved to be quite authoritative and enduring. It has been reissued many times in Egypt and subsequently reaffirmed by *fatwa*-granting authorities in other parts of the Sunni Muslim world, from Morocco to Saudi Arabia to Indonesia.

In general terms, the Sunni Islamic religious authorities have been very permissive in granting use of ARTs to Muslim IVF physicians and their patients. The Sunni *fatwa*s on ARTs have allowed:

1. Artificial insemination with a husband's sperm;
2. In vitro fertilization of an egg from a wife with the sperm of her husband;
3. Intracytoplasmic sperm injection (ICSI), in which the sperm of a husband is injected into the egg of his wife;

[1] Although a *fatwa* is non-legally binding, it is generally regarded as an authoritative Islamic religious decree, offered by an Islamic cleric who is considered to be an expert in Islamic jurisprudence.

4. Cryopreservation, or freezing, of any excess embryos, as well as sperm and eggs to be used later by a married couple;
5. Postmenopausal pregnancy using a wife's own cryopreserved embryos or oocytes, in combination with the sperm of her husband;
6. Preimplantation genetic diagnosis for couples at high risk of genetic disorders in their offspring;
7. Multifetal pregnancy reduction, a form of selective abortion, which eliminates one or more fetuses in a high-risk IVF pregnancy with triplets, quadruplets, or beyond. In general, Islam is permissive when it comes to therapeutic abortion, since it does not consider life to begin at the moment of conception;
8. Embryo research on excess embryos that are donated by couples for the advancement of scientific knowledge and the benefit of humanity; and
9. Uterine transplantation, a newly emergent technique in which a healthy uterus is transplanted from a willing donor to another woman who is lacking a competent uterus.

This clearly represents a substantial list of permissions, thereby fueling the development of a robust IVF industry across much of the Sunni Muslim world (Inhorn and Tremayne 2012). However, the Sunni religious authorities have not condoned every possible ART practice. The list of ART restrictions is equally long.

1. Most importantly, third-party donors are not allowed, whether they are providing donor sperm, eggs, embryos, or uteruses, as in surrogacy. The use of a third party is tantamount to *zina*, or adultery.
2. Therefore, all forms of surrogacy are forbidden.
3. A donor or surrogate child conceived through any of these illegitimate forms of assisted reproduction cannot be made legitimate through adoption. The child who results from a forbidden method belongs to the mother and is considered to be a *walad il-zina*, or an illegitimate child.
4. Assisted reproduction cannot be performed on an ex-wife or widow using sperm from a divorced or dead husband.
5. Sperm banks for the purposes of sperm donation are forbidden. Sperm may only be cryopreserved before cancer treatment and used later in life by that same individual.
6. PGD or sperm sorting techniques for the purposes of sex selection are forbidden.
7. Human reproductive cloning for the creation of a cloned child—who would theoretically be the genetic twin of the cloning parent—is forbidden.
8. Genetic alteration of embryos is forbidden. However, in the future, gene therapy may be approved to remediate inherited genetic diseases and pathological conditions.

This is a long list, but it clearly summarizes which technologies are *haram,* or forbidden in Sunni Islam. Most important from a clinical perspective, all forms of third-party donation are *haram*, including sperm donation, egg donation, embryo donation, and surrogacy. As noted by Ebrahim Moosa (2003),

In terms of ethics, Muslim authorities consider the transmission of reproductive material between persons who are not legally married to be a major violation of Islamic law. This sensitivity stems from the fact that Islamic law has a strict taboo on sexual relations outside wedlock (*zina*). The taboo is designed to protect paternity (i.e., family), which is designated as one of the five goals of Islamic law, the others being the protection of religion, life, property, and reason (p. 23).

With regard to the first issue, Islam is a religion that can be said to privilege—even mandate—heterosexual marital relations. As is made clear in the original Al-Azhar *fatwa*, reproduction outside of marriage is considered *zina*, or adultery, which is strictly forbidden in Islam. Although third-party donation does not involve the sexual body contact ("touch or gaze") of adulterous relations, nor presumably the desire to engage in an extramarital affair, it is nonetheless considered by most Islamic religious scholars to be a form of adultery, by virtue of introducing a third party into the sacred dyad of husband and wife. It is the very fact that another man's sperm or another woman's eggs enter a place where they do not belong that makes donation of any kind inherently wrong and threatening to the marital bond.

The second aspect of third-party donation that troubles marriage is the potential for incest among the offspring of anonymous donors. If an anonymous sperm donor, for example, "fathers" hundreds of children, the children could grow up, unwittingly meet each other, fall in love, and marry. The same could be true for the children of anonymous egg donors. Thus, moral concerns have been raised about the potential for incest to occur among donor children who are biological half-siblings.

The final moral concern is that third-party donation confuses issues of kinship, descent, and inheritance. As with marriage, Islam is a religion that can be said to privilege—even mandate—biological inheritance. Preserving the *nasab,* or genealogical "origins" of each child, meaning his or her relationships to a known biological mother and father, is considered not only an ideal in Islam, but a moral imperative. The problem with third-party donation, therefore, is that it destroys a child's *nasab* and violates the child's legal rights to known parentage, which is considered immoral, cruel, and unjust.

Muslim IVF patients use the term "mixture of relations" to describe this untoward outcome. Such a mixture of relations, or the literal confusion of lines of descent introduced by third-party donation, is described as being very "dangerous," "forbidden," "against nature," "against God"—in a word, *haram*, or morally unacceptable. It is argued that donation, by allowing a "stranger to enter the family," confuses lines of descent. For men in particular, ensuring paternity and the "purity" of lineage through "known fathers" is of paramount concern. This is because virtually all Muslim societies are organized patrilineally—that is, descent and inheritance are traced through fathers and the "fathers of fathers" through many generations. Thus, knowing paternity is of critical concern (Clarke 2009).

Accordingly, at the ninth Islamic law and medicine conference, held under the auspices of the Kuwait-based Islamic Organization for Medical Sciences (IOMS) in Casablanca, Morocco, a landmark five-point declaration included recommendations to prohibit all situations in which a third party invades a marital relationship through donation of reproductive material (Moosa 2003). Such a ban on third-party reproductive assistance is effectively in place in the Sunni-dominant countries. Not a single Sunni Muslim-majority country allows gamete donation and surrogacy,[2] and couples who need these technologies are told firmly that third-party donation is "against the religion."

The Emergence of Shia Islamic Third-Party Reproductive Assistance

However, the situation is changing for Shia Muslims, whose leading clerics have taken a step in a different direction. Shia Islam is the minority branch, constituting slightly more than 10 % of the world's Muslim population. Iran is the current epicenter of the Shia

[2] The possible exception is Mali, where at least one IVF clinic is performing third-party reproductive assistance (Horbst 2015).

world, where it constitutes the majority religion. Shia majorities are also found in Lebanon, Iraq, and Bahrain, and significant Shia minority groups are found in eastern Saudi Arabia, Syria, Turkey, as well as Afghanistan, Pakistan, and India.

Many Shia religious authorities support the majority Sunni Islamic view: Namely, they agree with Sunni *fatwa*s that prohibit altogether third-party reproductive assistance. However, in the 1990s, some Shia clerics began supporting third-party reproductive assistance, particularly egg donation, but also sperm donation. By the end of that decade, the Supreme Leader of the Islamic Republic of Iran, Ayatollah Ali al-Husseini al-Khamene'i, the handpicked successor to Iran's Ayatollah Khomeini, had issued an authoritative *fatwa* effectively permitting both egg and sperm donation to be used (Inhorn and Tremayne 2012). Ayatollah Khamene'i's *fatwa* justified these donor technologies as a "marriage savior," preventing the "marital and psychological disputes" that would otherwise arise from remaining childless indefinitely.

With regard to egg donation specifically, Ayatollah Khamene'i argued that egg donation "is not in and of itself legally forbidden." But he stated that *both* the egg donor and the infertile mother must abide by the religious codes regarding parenting. Thus, the child of the egg donor has the right to inherit from her, as the infertile woman who received the eggs is considered to be like an adoptive mother. With regard to sperm donation, Ayatollah Khamene'i stated in his *fatwa* that the baby born of sperm donation belongs to his biological father (i.e., the sperm donor) and thus can only inherit from him. But the infertile father is considered to be like an adoptive father, and thus the child takes his name from him.

Indeed, these Shia *fatwa*s—culminating in the 1999 *fatwa* of Ayatollah Khamane'i—have led to an "Iranian ART revolution" (Abbasi-Shavazi et al. 2008). Since the new millennium, all forms of sperm donation, egg donation, embryo donation, and gestational surrogacy are taking place in Iran. Iran is also leading the way into a Middle Eastern stem cell industry (Saniei 2012).

This "millennial moment" in Iran has also had a major impact in Shia-dominant Lebanon (Inhorn 2012). By 2003, one of the major Shia-serving IVF clinics in Beirut had developed a full-fledged egg donation program, and had begun to cater to so-called reproductive tourists coming from other parts of the Middle East. Soon, other IVF clinics in Lebanon began providing egg donation services, as market demand increased among both Shia and Sunni Muslims, as well as Middle Eastern Christian couples.

Indeed, it is fair to state that this development of third-party reproductive assistance programs in both Iran and Lebanon has weakened the regional Sunni Muslim ban on donor technologies. In particular, husbands sympathetic to their wive's infertility problems are active participants in obtaining egg donation, sometimes engaging in *mut'a,* or temporary marriages, in order to undertake egg donation within the remit of a temporary polygynous marriage (Inhorn 2012).

The Emergence of an ART Bioethical Aftermath

This use of temporary marriage as a way to make egg donation morally permissible is a creative solution to the moral challenges posed by third-party reproductive assistance within an Islamic framework. Yet, in the aftermath of the widespread Shia "opening" to third-party reproductive assistance, other bioethically troubling issues have continued to emerge.

The aftermath of sperm donation is case in point. Outside of Iran, not a single Muslim cleric, either Sunni or Shia, approves of this particular donor technology. As a result, sperm donation has provoked a particularly strong bioethical reaction from many conservative quarters in both the Shia and Sunni Muslim world. In Iran, sperm donation is largely shrouded in secrecy, practiced primarily in private clinics beyond the scrutiny of the state. This is because sperm donation is seen as defying deeply rooted patriarchal values in Iran, including patrilineal kinship reckoning, in which the father assumes priority and rights of ownership over the child. According to Twelver Shia Islam, the child takes his lineage from both parents (mother and father), but the father remains the sole "owner" of the child, with the mother's role viewed primarily as that of caretaker (Mir-Hosseini 1998). Thus, from a Shia bioethical perspective, using a sperm donor is tantamount to conceiving another man's child. Indeed, most Shia Muslim men, as well as Sunni Muslim men who oppose sperm donation, often argue that a sperm-donor child "won't be my son." For them, it would be the equivalent of raising another man's child (Inhorn 2006, 2012).

Egg donation, on the other hand, has been more easily accommodated in Shia bioethical discourses, with the majority of Shia jurists now allowing the practice. For infertile women who receive a donated egg, the fact that they can gestate, give birth to, and breastfeed the egg-donor child creates the bonds of *rida',* or milk kinship (Khatib-Chahidi 1992; Al-Torki 1980). These elements of perceived biogenetic relatedness between mother and child are not available to infertile men who seek to become fathers using donor sperm. As a result, infertile men's reactions to their sperm-donor children are not straightforward. In fact, in Iran, men's reaction to sperm donation has ranged from reluctant acceptance of their donor child, to major depression, to acts of physical violence against both mother and child (Tremayne 2009, 2012).

To prevent these untoward outcomes, many infertile Shia Muslim couples prefer to use their close relatives, especially same-sex siblings, for gamete donation. Thus, brothers donate their sperm to their brothers' wives, while sisters donate their eggs or uteruses (via surrogacy) to their infertile sisters and sisters-in-law. Indeed, if a sister donates her eggs to her brother's infertile wife, the child so produced would be the biological offspring of the actual brother and sister—a form of biological incest not only in Islamic societies, but in most if not all societies around the world. Furthermore, under Islamic law, this kind of intra-familial donation may lead to peculiar forms of relatedness and the possibility of committing incest or adultery according to the Islamic laws governing association between the sexes.

Namely, the extent of social and sexual interaction between men and women is regulated through the concept of *mahramiat* (closeness/privacy), which determines the boundaries of the interaction between men and women in society. Accordingly, men and women are divided into two groups—the *mahram* and *na-mahram.* The *maharem* (plural for *mahram*) are relatives, who are not potential marriage partners and with whom one may undertake free but not sexual interaction. Any sexual relationship between the *maharem* therefore constitutes incest. The *mahram* group includes one's siblings, parents, grandparents, aunts and uncles, children, and grandchildren. *Na-mahram*, on the other hand, are non-family members, who are potential marriage partners and with whom neither sexual nor social contact is permitted. Social contact with *na-mahram* individuals is supposed to remain limited and guarded. This latter category includes all non-family members, as well as those members of the kin group who are not part of the *mahram* category. There also exists a third category, namely those who are *mahram* at some point, but who become *na-mahram* due to changes in the individuals' marital status (see also Behnam 1973).

In the case of gamete donation within the kin group, egg and sperm donation between brothers and sisters and their spouses may violate the rules of *mahramiat,* while also leading to both incest and adultery. Yet, infertile couples who recruit their own relatives as gamete donors typically do not see their actions in this light. Because there is no sexual contact occurring during the donation process—in which gametes retrieved from individuals' bodies are placed in petri dishes and made into embryos there—ARTs allow family members to bypass the rules of *mahramiat,* as well as feelings of incest or adultery. Instead, by using a relative's gamete, the "purity" of the lineage can be maintained, and the donation can be kept "all in the family," strengthening those social bonds. Furthermore, the financial aspect of familial donation is also advantageous, as it typically does not entail payment to the donor.

Finally, the use of ARTs in Iran, Lebanon, and other Sunni-dominant countries of the Middle East has led to other bioethical conundrums. For example, even though son preference and daughter discrimination are anathema in Islam—with the Prophet Muhammad explicitly forbidding the pre-Islamic practice of female infanticide—the emergence of ARTs, particularly preimplantation genetic diagnosis (PGD), is leading to a new form of female "embryocide" in the Muslim world. Namely, in some Middle Eastern IVF clinics, couples who want sons, especially after the birth of only daughters, are using PGD to perform sex selection, culling female embryos in an attempt to produce male-only progeny (Inhorn 2015; Serour 2008). Furthermore, new forms of "fetal reduction" are occurring in many clinics, through selective abortion of fetuses in high-order multiple pregnancies (i.e., triplets and beyond) (Inhorn 2015; Serour 2008).

Like the ART-abetted forms of biological incest occurring in Iran, these "selective" practices of embryo and fetal "culling," especially of female offspring, are deeply troubling. However, these are part of the "bioethical aftermath" of ARTs in the Muslim world, a world where the widespread acceptance and use of ARTs has not been entirely unambiguous. Indeed, the emergence of ARTs has led to a bioethical "slippery slope," where technologies intended for one use may morph into another, as shown in the case of PGD and the "new" sex selection.

Conclusion

Having said this, it is fair to state that the Muslim world has nonetheless embraced ARTs with considerable enthusiasm while, at the same time, attempting to regulate them in accordance with local religious moralities. In the Sunni Muslim countries such as Egypt, the prohibition on third-party reproductive donation has clearly led to an entrenchment of deeply held religious beliefs about the importance of marriage, biological kinship, and family life, which no third party should tear asunder. For this reason, donor gametes continue to be morally shunned and clinically banned in the Sunni Muslim world, with donation itself equated to *zina,* or adultery.

Yet, having said this, the globalization of these technologies to other parts of the Shia Muslim world has fundamentally altered understandings of the ways in which families *can* be made and the ways in which marriages *can* be saved through the uses of ARTs. The permission of donor technologies in Shia-dominant Iran and Lebanon has led to a brave new world of reproductive possibility never imagined when these technologies were first introduced to the Middle East exactly 30 years ago. This emergence of donor technologies has led to, among other things, significant reproductive tourism from the Sunni to Shia regions of the Middle East; the mixing of gametes across familial, ethnic, national, and religious lines; and

the birth of thousands of donor children to devout infertile Muslim couples. Many infertile Muslim couples have also begun to reconsider traditional notions of biological kinning, even if "social parenthood" of a donor child is still not widely embraced.

Moreover, the availability of donor technologies has weakened the Sunni Muslim ban on third-party reproductive assistance across the region, with at least some infertile Sunni Muslim couples reconsidering their own anti-donation moral stances. As a result, Shia Muslim donor gametes are making their ways into Sunni Muslim bodies—an exchange of gametes that defies stereotypes about the rifts within Islam and the inter-sectarian tensions that are currently causing great pain to the Muslim body politic as a whole.

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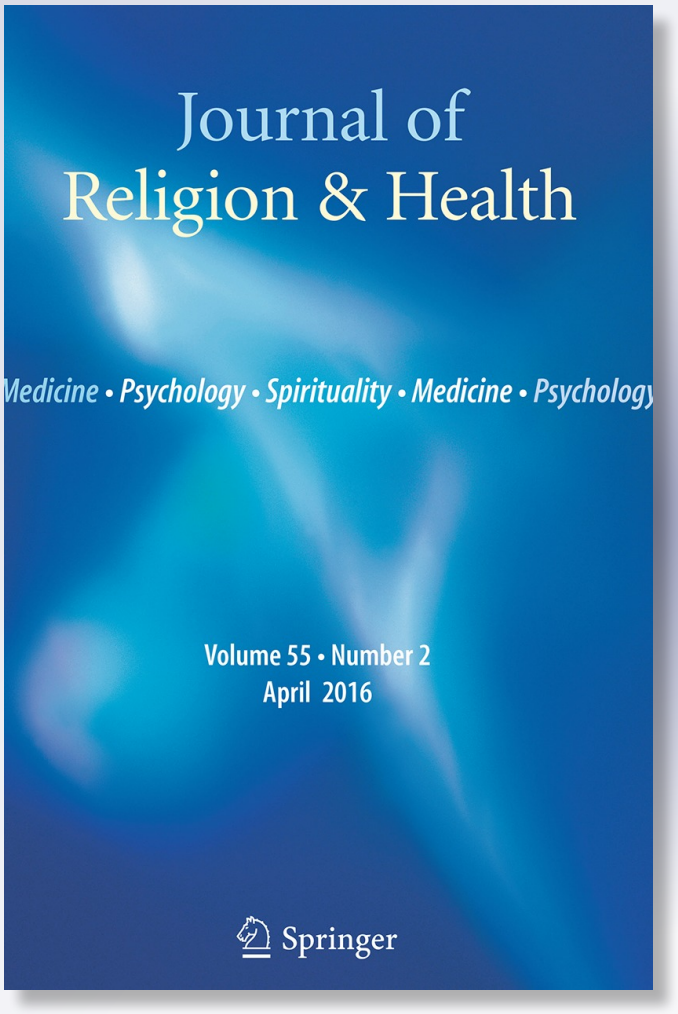

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