Chapter 10
Religiosity and Behavioral Health in Muslims

One of the most important factors that link religious involvement and physical health is health behavior. We know that certain behaviors, practices, and habits influence physical health in a major way. Most people underestimate the impact that these factors (many of which are under the individual's control) have on health and longevity. For example, three health behaviors—regular exercise, consuming a healthy diet and maintaining an ideal body weight, and avoiding cigarette smoking—have been shown to reduce mortality by over 50 % over 10 years, may add as many as 14 years to a person's life span, and could reduce chronic diseases by nearly 80 % (Knoops et al. 2004; Ford et al. 2009; Lee et al. 2009; Kvaavik et al. 2010). The cost of poor health behaviors is also a financial one. Indeed, increasing healthcare costs due to aging populations threatens to overwhelm the economic stability of both developed and developing nations (Zohrabian and Philipson 2010). We now examine research in Muslim populations on the role that religiosity plays in five health behaviors: cigarette smoking, physical activity, diet, weight, and sexual behavior.

Cigarette Smoking

For Muslims, a "fatwa" involves religious rulings that that are not specifically discussed in the Qur'an or Hadith, but are felt by religious scholars to be warranted based on what is contained in these texts. A relatively recent fatwa now places a ban on cigarette smoking for Muslims (Ghouri et al. 2006; Muhamad and Mizerski 2013). When such a fatwa is issued, it becomes an integral part of Islamic law (sharia). Despite this, however, cigarette smoking is relatively high in Muslim countries, especially among men (e.g., Saudi Arabia 19 %, Turkey 51 %, Indonesia 69 %) (Ghouri et al. 2006). Our 2010 systematic review identified five studies that examined relationships between cigarette smoking and religiosity in Muslim-majority populations, and one qualitative study asked participants reasons for their not smoking.

H.G. Koenig and S. Al Shohaib, *Health and Well-Being in Islamic Societies: Background, Research, and Applications*, DOI 10.1007/978-3-319-05873-3_10,

Of the five quantitative studies, three reported significantly less smoking among Muslims who were more religious. We review these qualitative and quantitative studies and then examine research that has compared smoking in Muslims compared to non-Muslims.

Religiosity. In a qualitative study, Naing and Ahmad (2001) examined factors related to cigarette smoking in 180 male teachers and trainee teachers at secondary schools in Malaysia. The most common reason given for not smoking among non-smokers was that smoking was against their religious beliefs. In the first quantitative study to examine the subject, Ozcan and Ozcan (2002) analyzed data on religiosity and cigarette smoking in 4,767 high school students in Ankara, Turkey. No significant association was found between family religiosity or school type (religious vs. other) and smoking. Al-Kandari (2003) conducted a quantitative study that examined smoking and religiosity in 223 Kuwaitis ages 18–75, finding that religious commitment was inversely related to smoking ($r = -0.17$, $p < 0.05$). A third quantitative study by Afifi Soweid and colleagues (2004) surveyed 954 first-year college students in Beirut, Lebanon, finding that religiosity (4-item measure) was inversely related to smoking in the overall sample ($p < 0.001$, uncontrolled) and in both men and women when analyzed separately. Similar findings were reported by Nakhaee and associates (2009) who examined these relationships in 833 Muslim college students in Iran, finding that each of four religious activities (prayers, Qur'an reading, mosque attendance, fasting) were inversely related to smoking (all $p < 0.001$, uncontrolled). Combining the religious activities into an index and dividing the sample into high, medium, and low religiosity, researchers constructed a regression model that controlled for multiple other covariates. They found that those with high religiosity were about one-half as likely to smoke as those with low religiosity (OR = 0.53, 95 % CI 0.33–0.84, $p < 0.01$).

Finally, Yong and colleagues (2009) conducted an 18-month prospective study of 693 Muslim Malaysian and 1,539 Buddhist Thai adult smokers, finding that Thai Buddhists were more likely than Muslim Malaysians to have made an attempt to quit smoking (74.2 % vs. 47.9 %, $p < 0.001$). However, Malaysian Muslims were more likely to quit successfully (23.2 % vs. 16.8 %, $p = 0.05$). Note that 79 % of Malaysian Muslims and 88 % of Thai Buddhists said that their religion discouraged smoking. Only 8.1 % of Malaysian Muslims said that a fatwa (Islamic ruling) exists that forbids smoking in Islam, whereas 14.9 % said that Ramadan motivated them to quit smoking. After age, gender, income, education, locality, and daily cigarette consumption were controlled for in a regression model, religiosity did not predict either attempts to quit smoking or successful quitting. Although those who said that their religion discourages smoking were more likely to attempt quitting (OR = 3.37, 95 % CI 1.77–6.40), they were not more likely to be successful at quitting. In a later report, Yong and associates (2013) found that religious norms were more important in discouraging cigarette smoking in Muslims than were societal norms (whereas the opposite was true in Thai Buddhists).

Muslims vs. Non-Muslims. We identified seven additional studies that compared Muslims with non-Muslims on cigarette smoking. Adelekan et al. (1993) compared

current and lifetime cigarette smoking between 483 Christian and 137 Muslim students at a Nigerian university in 1988. Christians were no more likely than Muslims to either currently smoke (10 % vs. 10 %, respectively) or have a lifetime history of smoking (38 % vs. 42 %). Likewise, Fatoye (2003) examined cigarette smoking in 557 high school seniors in southwestern Nigeria, finding that current and lifetime tobacco use were acknowledged by 7 % and 13 % of 46 Muslim students compared to 3 % and 8 % of 511 Christian students (no significant differences). Similarly, Pampel (2005) analyzing data from a sample of 5,111 men and 20,809 women ages 15–59 in Malawi and Zambia found few differences in cigarette smoking between Catholics, Protestants, and Muslims, all of whom tended to smoke less than those affiliated with other religions. Khan and colleagues (2006), examining 4,297 males ages 15–54 from Bangladesh, also found no differences in Muslims and non-Muslims in likelihood of smoking cigarettes. When these researchers later (Khan et al. 2009) stratified their sample (increased now from 4,297 to 12,155) into those living in slum and non-slum areas, significant differences were found. While there was no difference in smoking between Muslims and Christians in slum areas, Muslims were less likely to smoke than were Christians in non-slum areas (44.1 % vs. 61.6 %, $p<0.01$).

Two additional studies have found differences in smoking behavior between Muslims and Christians. Chaturvedi and colleagues (2003) surveyed 1,831 Hindus, Muslims, and Christians in Northeast India, finding that Hindus and Muslims were less likely to use tobacco than Christians (25.9 % and 22.2 % vs. 42.85, respectively, $p<0.01$). Similar findings were reported by Bradby and associates (2006) who examined Christian, Muslim, and Hindu/Sikh high school students in Scotland asking them at ages 14–15 ($n=620$) and at 18–20 years old ($n=375$) whether they had ever smoked cigarettes. At ages 14–15, Christian boys were more likely (45 %) than Muslims (32 %) or Sikh/Hindu (24 %) to have ever smoked, although these differences disappeared by ages 18–20. Among girls, Christians at ages 14–15 were also more likely (59 %) than Muslims (31 %) and Sikh/Hindu (17 %) to have ever smoked, and this pattern continued when they were 18–20 years old (75 % Christian, 51 % Muslim, 9 % Sikh/Hindu).

Missed Studies. Our 2010 systematic review missed several studies that examined religiosity and smoking in Muslims or compared Muslims to non-Muslims. Islam and Johnson (2003) examined correlates of smoking behavior in 461 Muslim students in 7th to 12th grades attending school in Fairfax County, Virginia (50 % female, 42 % from Saudi Arabia). Students were asked "How effective do you think religious advice is in preventing youth from smoking?" with responses ranging from not effective whatsoever (1) to very effective (4) (called "religious influence"). Susceptibility to smoking, experimentation with cigarettes (ever smoked), and smoking behavior in the past 30 days were assessed. Religious influence was inversely related to susceptibility to smoking ($r=-0.23$, $p<0.05$) and to ever having smoked ($r=-0.16$, $p<0.05$). When other predictors were controlled in a regression model, high religious influence predicted a 28 % reduction in likelihood of ever having smoked (OR = 0.72, 95 % CI 0.57–0.92, $p<0.05$), which was particularly strong in females (OR = 0.60, 95 % CI 0.40–0.80).

Vucina and Becirevic (2007) surveyed 732 high school students from Mostar (Bosnia), where about 50 % of the population are Muslim and 50 % are Christian. They examined risk and protective factors regarding cigarette smoking and use of other drugs. Mean age was 16.8 and 51 % were female. Smoking was a common practice with 70 % having smoked cigarettes at least once and 42 % smoking within the last 30 days. Religiosity was assessed using a 19-item measure with two subscales, one measuring religious beliefs and the other religious practices. In addition, importance of religious faith was assessed with a single item ranging from 1 (not important at all) to 7 (extremely important). Religious affiliation was not reported. Religious beliefs ($r = -0.09$, $p < 0.05$), religious practices ($r = -0.12$, $p < 0.001$), and faith ($r = -0.09$, $p < 0.05$) were all inversely correlated with cigarette smoking. However, after controlling for multiple sociodemographic, individual, family, and peer factors, no religious measure significantly predicted cigarette use (although it is likely that the effect of religiosity was explained by these other factors).

In a qualitative study, Khader and Alsadi (2008) examined factors related to smoking behavior among 712 college students in Jordan (52 % males, mean age 21). Current smoking was present in 56.9 % of men and 11.4 % of women. Reasons for not smoking were explored. The most common reason given was adverse effects on health (36 %). The second most common reason was religious belief (33 %).

One additional study examined differences in smoking by religious affiliation. Bachir and Chaaya (2008) identified determinants of smoking during pregnancy in 538 pregnant women hospitalized in Lebanon. Smoking included both narghile and cigarettes. Religious affiliation of participants was either Christian (19 %) or Muslim (81 %). Logistic regression was used to determine predictors of cigarette smoking during pregnancy, controlling for age, education, personal problems, financial problems, nervousness, and social support. Results indicated that Muslim women were nearly three times more likely than Christian women to smoke (OR = 2.75, 95 % CI = 1.32–5.70, $p < 0.01$).

Recent Research. Since our 2010 systematic review, at least three additional studies have now examined relationships between religiosity and smoking. Divsalar and colleagues (2010) examined religiosity and other factors related to cigarette smoking in 1,065 students at Kerman University of Medical Sciences in Iran (77 % female, 23 % smoking). Religiosity was assessed using a 40-item religious attitude scale. Results indicated significantly lower religiosity ($p = 0.01$) in smokers compared to nonsmokers, regardless of general health status. A second quantitative study by Kamal and associates (2011) surveyed 474 male college students in Bangladesh (91 % Muslim, mean age 23). A total of 35 % currently smoked (lower than the national average of 64 %) and an additional 25 % said they had quit within the past 30 days. Students in the department of religion were least likely to smoke (1.2 %), significantly different from students in other departments. The finding persisted after controlling for year in school, rural–urban residence, mother's education and occupation, financial status, and whether father or other family members smoked.

We are aware of only one randomized clinical trial that has examined the effects of a religious intervention to decrease smoking in Muslims. Tahlil and colleagues (2013) compared an Islamic-based intervention (IBP) to a health-based intervention (HBP), a combined intervention, and a non-treated control group in 477 seventh and eighth grade students in Aceh, Indonesia. Randomization was at the school level such that eight junior high schools were randomly assigned to a control group (two schools) or to one of the three smoking intervention groups (two schools each). As a result, 109 students were assigned to the IBP, 122 to the HBP, 109 to the combined program, and 128 to the no-intervention control group. Outcomes were Islamic knowledge about smoking, positive attitude toward smoking, intention to smoke, smoking in the past week, smoking in the past 30 days, and percent lifetime smoking. The HBP involved eight 2-h classroom lectures over 8 weeks on smoking prevention knowledge and skill development. The IBP consisted of eight 2-h sessions over 8 weeks that involved teaching and practicing smoking prevention skills based on Islamic teachings that included basic concepts of Islam, health concepts in Islam, expected smoking behavior in Islamic societies, and Islamic law regarding smoking. The combined intervention included components of the two other interventions (HBP and IBP) delivered in eight 2-h sessions over 8 weeks. Those in the control group received no smoking prevention education.

Groups were added together for analysis. Those receiving the IBP ($n=109$) were added with those receiving the combined program ($n=109$) to form the Islamic Group ($n=218$), and those receiving the HBP ($n=122$) were added to those in the control group ($n=128$) to form the Non-Islamic Group. Results indicated that compared to the Non-Islamic Group, those in the Islamic Group had a significantly greater increase in Islamic knowledge ($B=+3.5$, $p<0.001$) and decrease in positive attitudes toward smoking ($B=-7.1$, $p<0.001$), although there was no difference regarding intention to smoke in the future. Likewise, there was no difference between groups in smoking during past week, smoking during past 30 days, or lifetime smoking. Researchers concluded that while the Islamic-based program influenced knowledge and attitudes, it did not have much of an effect on smoking intention or behavior. However, the rate of smoking among students was low to begin with, i.e., 8 %, and this may have reduced the power of the study to detect differences between treatments.

Summary. Of nine studies that examined relationships between religiosity and smoking or smoking attitudes, six found significantly less smoking among Muslims who were more religious. In addition, a randomized clinical trial found that an Islamic intervention to influence attitudes toward smoking and smoking behaviors was effective in altering attitudes toward smoking, but had no influence on behavior (Table 10.1). Eight additional studies compared smoking behavior between Muslims and non-Muslims. Four found no difference in smoking between Muslims and Christians, three reported less smoking in Muslims than Christians, and one study in hospitalized pregnant women found more smoking in Muslims than Christians.

Table 10.1 Religiosity and health behaviors in Muslims

Authors (year)	Method	Sample size	Participants	Location	Controls	Findings
Cigarette smoking						
Ozcan and Ozcan (2002)	CS	4,767	High school students	Turkey	MC	NA
Al-Kandari (2003)	CS	223	Adults ages 18–75	Kuwait	None	P
Islam and Johnson (2003)	CS	461	Muslim high school students	USA	MC	P
Afifi Soweid et al. (2004)	CS	954	College students (1st year)	Lebanon	None	P
Vucina and Becirevic (2007)	CS	732	High school students	Bosnia	MC	NA
Nakhaee et al. (2009)	CS	833	College students	Iran	MC	P
Yong et al. (2009)	PC	693	Adult smokers	Malaysia	MC	NA
Divsalar et al. (2010)	CS	1,065	College students	Iran	None	P
Kamal et al. (2011)	CS	474	College students	Bangladesh	MC	P
Tahlil et al. (2013)	RCT	477	7th and 8th graders	Indonesia	–	P (attitudes)
Exercise						
Cohen and Azaiza (2007)	CS	162	Adult Arabs	Israel	MC	NA
Kahan (2009)	CS	214	Arab college students	USA	MC	NG
Merom et al. (2012)	CS	970	Palestinian adults	Israel	None	NA
Diet						
Cohen and Azaiza (2007)	CS	162	Adult Arabs	Israel	MC	NG
Weight						
Perk et al. (2001)	PC	17	Hypertensive men	Israel	None	P
Kahan (2007)	CS	215	Arab college students	USA	MC	NG
Woofenden (2012)	CS	291	Female college students	Jordan	None	NA
Bharmal et al. (2013)	CS	120	Asian Indians (Muslim)	USA	MC	NA
Sexual behavior						
Lagarde et al. (2000)	CS	858	Adults ages 15–59	Senegal	MC	NA
Herzog (2003)	CS	198	Arab adults	Israel	MC	NA
Trinitapoli and Regnerus (2006)	CS	978	Adult men	Malawi	MC	P

Mohammadi et al. (2006)	CS	1,385	High school students	Iran	MC	(P)
Gilbert (2008)	CS	231	College students	Senegal	SC	P
Yasan et al. (2009)	CS	638	College students	Turkey	MC	P
Shirazi and Morowatisharifabad (2009)	CS	200	College students	Iran	None	P
Kagimu et al. (2011)	CS	2,224	Muslim youth (15–24)	Uganda	None	P
Rahman et al. (2012)	CS	1,032	High school students	Malaysia	SC	P

CS cross-sectional, *PC* prospective, *CC* case control, *RCT* randomized clinical trial, *NA* no association, *P* significant positive association, (*P*) trend positive association ($0.05 < p < 0.10$), *NG* significant negative association, *M* mixed (both significant positive and negative findings), *C* complex association, *MC* multiple controls, *SC* some controls, *Q* qualitative report

Physical Activity/Exercise

Regular physical activity and exercise is known to influence mental and physical health in children, adolescents, and adults (Biddle and Asare 2011; Penedo and Dahn 2005). Within Muslim countries and immigrant populations, physical activity does not have the same priority it does in some Western nations. Involvement in regular exercise or sports may be seen as taking time away from work, from achieving educational or career goals, or possibly even from religious activity. Young Muslims who are increasingly influenced by Western culture may also prefer to hang out, watch TV, spend time on the Internet, etc., which tend to decrease physical activity (Kahan 2003). In general, however, Islam itself encourages physical activity and sport in both men and women, although some interpretations of Islam may discourage such activity (Walseth and Fasting 2003). This is especially true for women, where the use of the veil, gender segregation, issues related to "sexual excitement" with physical activity, and the power relationship between men and women may have an influence. For whatever reason, the general impression is that Muslim populations tend to be less physically active than other religious groups.

Our systematic review uncovered only one study among Muslims that examined the relationship between physical activity and religiosity. Cohen and Azaiza (2007) surveyed a random, population-based sample of 358 Jews and 162 Arabs ages 50–75 in Israel, examining factors related to health behaviors such as exercise. Degree of religiosity was assessed with a single question that asked respondents to categorize themselves as secular, mildly religious, moderately religious, or very religious. Physical exercise was assessed using the Health-Promoting Behaviors Questionnaire. Results indicated that among both men and women, Muslim Arabs scored significantly lower on physical exercise than Jews ($p<0.001$, controlled for gender, age, education, economic status, and other variables). Religiosity was unrelated to frequency of physical exercise in bivariate or multivariate analyses in the combined group.

Missed Studies. The present review uncovered one additional study prior to 2010 by Kahan (2009). He recruited 214 Arab college students in southern California to examine correlates of physical activity. Religious affiliation was determined (49 % Muslim, 51 % non-Muslim), and religiosity was measured using a 6-item scale with response options ranging from 1 to 7 (total score divided into low, medium, or high for analysis). Variables that measured physical activity were energy expenditure (kcal/kg), step count, and participation in 20 activities that required physical activity. Results indicated no difference between Muslims and non-Muslims on energy expenditure, overall step count/day, or likelihood of engaging in vigorous physical activities. While Muslims were less likely than non-Muslims to be among those averaging more than 10,000 steps per day (29.5 % vs. 42.2 %, $p=0.05$), they were more likely to engage in at least one vigorous physical activity (sport) per week (37.1 % vs. 24.8 %, $p=0.05$). Religiosity was unrelated to energy expenditure or vigorous physical activity participation. However, those with medium religiosity had a higher overall step count than those with high religiosity (9,916/day vs. 8,536, $p=0.02$) and were more likely to be among those averaging more than 10,000 steps

per day (46.0 % vs. 23.7 %, $p = 0.01$). The association persisted after controlling for gender, body mass index, religion, and acculturation. Based on this study, it is unclear whether Muslims are more or less active than non-Muslims, and those who are highly religious appear to be less active (at least on steps taken per day) than those with medium religiosity.

Recent Research. At least four studies since our 2010 systematic review have examined relationships between religion and exercise/physical activity in Muslim populations. Williams and colleagues (2010) examined risk factors for coronary heart disease, including exercise, among 1,065 healthy South Asians living in West London, UK (vs. 818 white Europeans). Religious affiliation was recorded (15.8 % Muslim, $n = 179$), and religiosity was measured using a 4-item version of the Santa Clara Strength of Religious Faith scale. Strength of religious faith was highest among Muslims. However, compared to the other groups (Sikh, Hindus, white Europeans), Muslims were significantly more likely to be engaged in sedentary behavior (55 % more than 3 h/day vs. 43–48 % for other groups, $p < 0.01$). Muslims were also less likely to engage in moderate or vigorous physical activity during the week (63 % vs. 74–79 %, $p < 0.01$). The relationship between physical activity and religiosity in Muslims was not examined.

Lerner-Geva and colleagues (2010) studied differences in lifestyle among women in midlife (ages 45–64) from three different religious groups in Israel: long-term Jewish residents ($n = 540$), Jewish immigrants from Russia ($n = 151$), and Arabs ($n = 123$). "Healthy lifestyle" was defined as currently not smoking, physically active during the past year, and healthy dietary habits. Results indicated that healthy lifestyle was significantly less common among Arab women (9.7 % for Arabs vs. 15.5 % for Russian immigrant Jews and 39.5 % for long-term Jewish residents, $p < 0.0001$).

Kalter-Leibovici and associates (2011) examined risk factors for adult-onset diabetes in a random national sample of 544 Arabs and 548 Jews in Israel. A physical activity score was calculated based on the frequency and duration of leisure and non-leisure physical activity. Results were stratified by diabetic status. Among non-diabetics, 36.3 % of Arabs scored in the lower third on the physical activity score compared to 21.1 % of Jews. Likewise, 30.7 % of Arabs scored in the upper third of physical activity compared to 39.5 % of Jews. The differences were even more pronounced among diabetics, where 65.8 % of Arabs scored in the lower one-third on physical activity compared to 32.3 % of Jews, and 11.4 % of Arab diabetics scored in the upper one-third on physical activity compared to 41.5 % of Jewish diabetics. Although these differences were not compared statistically, given the sample size they are almost certainly significant.

Finally, Merom and colleagues (2012) compared physical activity levels between 970 Palestinians and 712 Israelis ages 24–74 living in East and West Jerusalem. Concerning religiosity, respondents categorized themselves as orthodox, traditional, or secular. A scale was used to assess 28 specific physical activities of different effort levels during a typical week in the past month. Minutes of each activity were multiplied by its frequency to come up with energy expenditure during a typical week (MET/min/wk). Results indicated no relationship between physical activity

and religiosity in Palestinian men or women. However, Palestinian men expended nearly twice as much MET/min/wk in energy compared to Israeli men (7,161 vs. 3,638, $p < 0.0001$). Among women, however, there was no difference.

Summary. Of three studies that have examined religiosity and exercise in Muslims, two found no association and the third found less physical activity among the more religious. Additional research is clearly needed, although it appears that greater religious involvement among Muslims is either unrelated to physical activity or inversely related to it, perhaps for the reasons noted earlier. The general impression that Muslims tend to be less physically active than other religious groups appears to be confirmed by the research. Of six studies that compared Muslims with other faith traditions (Jews, Sikh, Hindu), Muslims exercised less or were less physically active in four studies (three from Israel and one from the UK). One study reported mixed findings among Muslims in the USA, and one found that Palestinian Muslims were more physically active than Jews in Jerusalem. No studies, however, have compared exercise or physical activity between Muslims and non-Muslims in Muslim-majority countries.

Diet

Eating patterns and food intake is important to Muslims. Based on the Qur'an and Sunna, certain foods are considered forbidden (haram), whereas others are lawful and permitted (hallal). Forbidden foods include pork, blood, and meat that have not been prepared according to Islamic rulings (Regenstein et al. 2003). Furthermore, fasting is an important practice, not only during the month of Ramadan but at other times as well (see Chap. 2). Although no food or liquid is to be consumed from sunrise (Sahur) to sunset (Iftar), Muslims eat a greater variety of foods during Ramadan than during the rest of the year and increase their intake of sugary foods and drinks (Dima-Cozma and Cozma 2012). On average, however, Muslims tend to experience a mild drop in average blood sugar levels and lose about 3–8 lb during Ramadan. Despite the importance of food and fasting in Islam, our 2010 systematic review identified no research that examined the relationship between religiosity and diet or quality of nutritional intake in Muslim-majority countries.

Missed Studies. However, during the current review, we uncovered several studies relevant to this topic. First, Bonne and colleagues (2007) examined characteristics associated with eating halal meat among 576 adults (mean age 31) attending a national conference of Muslims in France. Identity as a Muslim was assessed using a single statement, "I consider myself a Muslim," with a 5-point response range from totally disagree to totally agree. The outcome, halal meat consumption, was assessed with the question, "How many times do you intend to eat halal meat in the next 7 days, today included?" Interestingly, results indicated no relationship between identity as a Muslim and intention to eat halal meat. However, among those with strong identity as Muslims, the decision of whether or not to eat halal meat was

determined by the opinion of other important persons and institutions, i.e., the norms and rules prescribed by their religion. Thus, it appears that religion does influence the type of food consumed, at least among those with strong Muslim identity.

In a study described earlier, Cohen and Azaiza (2007) compared a random population-based sample of 358 Jews and 162 Arabs ages 50–75 in Israel, examining health-promoting behaviors and religiosity. Among those behaviors was eating a balanced diet, assessed with a single question with responses ranging from 1 (strongly disagree) to 5 (strongly agree). Results from a multivariate regression model, adjusting for gender, age, education, economic status, religiosity, and locus of health control, indicated that Arabs were significantly less likely to say they ate a balanced diet compared to Jews ($B = -0.12$, $p < 0.01$). Likewise, religiosity (assessed on a 4-point scale from secular to very religious) was also significantly and inversely related to eating a balanced diet in that same statistical model ($B = -0.12$, $p < 0.01$).

The last study involves breastfeeding. This practice is associated with better childhood and adult health and both the World Health Organization and the American Academy of Pediatrics recommend that babies be breastfed exclusively for the first 4–6 months of life. Al-Sahab and colleagues (2008) analyzed data from a prospective study of 1,320 healthy newborn infants from Beirut, Lebanon, who were followed for their first year of life. Muslims were 3.5 times more likely than Christians to exclusively breastfeed their infants for the first 4 months after birth (OR = 3.5, 95 % CI 2.5–4.8). After controlling for gender of pediatrician, parity, early discharge, maternal age, and maternal employment status using stepwise regression, Muslims were still nearly twice as likely as Christians to breastfeed for at least 4 months. As stated in the Qur'an, "We have commanded people to be good to their parents: their mothers carried them, with strain upon strain, and it takes 2 years to wean them" (31:14).

Recent Research. Although we could find no studies since our 2010 review that examined the relationship between religiosity and diet or nutritional intake in Muslims, two studies (both cited earlier) compared Muslims with non-Muslims on dietary habits and food consumption. First, Williams and associates (2010) compared the dietary practices of 1,065 healthy South Asians (including 179 Muslims) and 818 white Europeans living in London, UK. Age- and gender-adjusted analyses revealed that Muslims had the lowest fruit/vegetable intake (one serving or more per day) when compared to Sikhs, Hindus, and white Europeans (19.6 % vs. 26.7 %, 28.1 % and 42.0 %, respectively, $p < 0.05$). However, Muslims were more likely to eat low-fat products than the other groups (73.3 % vs. 58.6 %, 61.7 % and 52.5 %, respectively, $p < 0.05$). Muslims were also less likely to eat full-fat products (12.1 % vs. 16.1 % for Sikhs and 18.0 % for Hindus), but were more likely to do so than white Europeans (8.7 %).

Finally, Kalter-Leibovici and colleagues (2011) compared diabetic risk factors in a population-based sample of 544 Arabs and 548 Jews in Israel. They found that the average dietary energy density of food eaten (kcal/g) was higher in Arabs than in Jews among nondiabetics (29.5 % high density in Arabs vs. 19.7 % density in Jews) and even more so among diabetics (35.4 % vs. 17.5 %). Thus, according to this study, Arabs in Israel are more likely than Jews to eat high-calorie foods.

Summary. There is not enough evidence yet to conclude that religiosity is related to a better or worse diet or that Muslims are more or less likely to consume a better diet than members of other religious groups. Only one study examined the effects of religiosity on diet, and it found that great religiosity was associated with a lower likelihood of eating a balanced diet. Four studies compared Muslims with other religious groups. Two of these reported that Muslims in Israel ate a less balanced diet or a higher calorie diet than Jews. One found that while Muslims were less likely to eat fruits and vegetables than Sikhs, Hindus, or white Europeans in the UK, they were more likely to eat a low-fat diet than the other religious groups. In the last study, and only one conducted in a Muslim-majority country (Lebanon), researchers found that Muslims were more likely to breastfeed their infants for the recommended time. More research is clearly needed in Muslim-majority countries on the relationship between religiosity and dietary behavior.

Weight

The Qur'an says, "Eat from the good things We have provided for you, but do not overstep the bounds, or My wrath will descend on you. Anyone on whom my wrath descends has truly fallen" (20:81). Furthermore, extravagance is discouraged: "eat and drink [as We have permitted] but do not be extravagant: God does not like extravagant people" (7:31). Nevertheless, a large female body is venerated in Muslim Arab society, and in some Muslim countries, over 90 % of women say that they currently want to gain weight or did in the past (Rguibi and Belahsen 2006). There may also be Islamic beliefs regarding Allah's will concerning one's body size that may discourage attempts to lose weight or seek a healthy body weight (Batnizky 2011). Furthermore, religious rituals and social events often encourage elaborate and excessive food preparation to demonstrate hospitality, and guests may overeat as a show of appreciation and to avoid insulting their hostess.

Consequently, of the eight countries in the world with the highest average body mass index (BMI) per person, three of these are Muslim-majority countries: Kuwait (#1), Egypt (#6), and United Arab Emirates (#8) (however, note that the USA is #2 on this list) (Bond 2013). Unfortunately, not much research has examined the relationship between religiosity and weight or BMI in Muslim countries. Our 2010 systematic review located only one such study, which examined the effect of the Ramadan fast on weight among hypertensive Muslims living in Israel. Perk and colleagues (2001) studied 17 hypertensive Muslim adults living in Israel (mean age 57, 88 % men). Blood pressure and weight were determined before and during the last week of Ramadan. During Ramadan, although there was no change in blood pressure, participants lost an average of 3.1 lb ($p<0.002$).

Missed Studies. In a previously cited study of 214 Arab American college students in the USA (49 % Muslim, 54 % female), Kahan (2007) reported relationships

between religion, religiosity, and physical activity. One-third of the sample (33.2 %) was overweight or obese. Those who were overweight were more likely to be Muslim (39.1 % vs. 27.5 % for non-Muslim, $p = 0.05$) and were more likely to be high on religiosity (40.2 % vs. 26.7 % for non-overweight individuals, $p < 0.05$). After controlling for other factors in a regression model (gender, socioeconomic status, acculturation, and physical activity), Muslims were 3.6 times more likely to be overweight (OR = 3.62, 95 % CI 1.51–8.72), and those who were high on religiosity were 2.5 times more likely to be overweight (OR = 2.46, 95 % CI 1.17–5.18).

Latzer and associates (2009) examined differences in BMI between 926 Muslim, 128 Christian, and 87 Druze girls ages 12–18 year living in Israel. Participants were systematically sampled throughout Israel from schools randomly selected from urban and rural settings. Girls affiliated with the Druze religion were more likely to be currently dieting (44.5 % vs. 29.9 % of Christians and 28.3 % of Muslims, $p < 0.05$), and also had lower BMI scores (18.9 vs. 20.8 for Christians and 20.9 for Muslims, $p < 0.0001$). Religiosity was not examined.

Recent Research: Several studies since 2010 have compared Muslims with non-Muslims on body weight or BMI. In the previously cited study by Lerner-Geva and colleagues (2010), researchers compared BMI between female long-term Jewish residents ($n = 540$), Jewish immigrants from Russia ($n = 151$), and Arabs ($n = 123$). Obesity was more common among Arab women than other groups (49.1 % obese vs. 34.4 % of Russian immigrants and 21.4 % of Jewish long-term residents ($p < 0.0001$, uncontrolled).

Dunkel and associates (2010) surveyed 95 Muslim women and 106 non-Muslim women (88 % Christian) in middle to upper-middle class neighborhoods of Illinois and Iowa, in order to determine relationships between body satisfaction, BMI, and Muslim dress preferences. The sample was stratified into younger (ages 18–26) and older (ages 40–74) women. Participants were divided into five groups: non-Muslims, Muslims wearing Western dress alone, Muslims wearing Western dress with veil, Muslims wearing Muslim dress but without veil, and Muslims wearing Muslim dress with veil. The last group was considered to be the most religious (or at least, most compliant with Muslim religious cultural practice). Among younger women, Muslims who wore Muslim dress with veil ($n = 28$) had the lowest BMI and non-Muslim women ($n = 54$) had the highest BMI (20.25 vs. 23.17, respectively, $p < 0.05$). Among older women, Muslims who wore Muslim dress with veil ($n = 28$) also had lower BMI than non-Muslim women ($n = 51$) (24.61 vs. 28.15, respectively, $p < 0.05$).

In the previously described study by Kalter-Leibovici and associates (2011), which examined a population-based sample of 544 Arabs and 548 Jews from an urban area of Israel, researchers measured BMI in diabetics and nondiabetics in each group. The prevalence of obesity (BMI ≥ 26.0) was lower in Arabs than in Jews for both nondiabetics (24.2 % vs. 33.0 %, respectively) and diabetics (47.2 % vs. 65.6 %, respectively). This is despite the fact that both nondiabetic and diabetic Arabs exercised less and consumed higher calorie foods than Jews.

In a study that focused on religiosity and body image, Woofenden (2012) measured BMI in 291 female college students in Jordanian and 189 female students in America. Jordanian women (97 % Muslim) ranged in age from 18 to 43 (mean age 21), with BMI ranging from 13.7 to 58.1. American women (75 % Christian) ranged in age from 18 to 63 (mean age 20.0), with BMI ranging from 16.3 to 50. Religious faith was assessed using the 10-item Santa Clara Strength of Religious Faith Scale. Results indicated that average BMI was significantly higher in American compared to Jordanian students (23.6 vs. 21.7, $t=4.7$, $p<0.001$). Strength of religious faith was unrelated to BMI in either Americans or Jordanians.

Hossain and colleagues (2012) analyzed data on 10,115 married, currently non-pregnant women ages 15–49 in Bangladesh (90 % Muslim). Adjusting for age, education, number of families, wealth, number of children, age at first childbirth, age when married, and husband's education using regression analysis, results revealed that average BMI was significantly higher among Muslim women compared to non-Muslims ($B=+0.51$, $p<0.001$).

Finally, a study of religiosity and weight was conducted by Bharmal and researchers (2013) among 3,228 mostly immigrant Asian Indians living in California. Religious affiliations of the sample were 60 % Hindu, 20 % Sikh, 6 % Muslim ($n=120$), and 15 % other or agnostics. Religiosity was assessed using a scale composed of self-rated religiosity, religious beliefs, and religious participation. While religiosity was positively related to BMI in Hindus and Sikhs, it was unrelated to BMI in Muslims (OR = 0.69, 95 % CI 0.28–1.70, controlling for acculturation, time in the USA, age, gender, marital status, education, health status, and smoking status). Researchers explained this by the fact that Muslims do not drink alcohol (which is associated with weight gain) and pray five times a day, which is associated with changes in body position (a form of exercise).

Summary: Four studies have examined the associations between religiosity and weight or BMI in Muslims (Table 10.1). One found a significant decrease in weight during Ramadan fasting, and one found that religiosity in Arab American college students was positively related to being overweight. Two studies found no association between religiosity and weight, one among college students in Jordan and one in Asian Indian Muslims in California. Seven studies compared the body weight of Muslims with that of non-Muslims. Two found that Muslim Arab American college students and Muslims in Israel were significantly more likely to be overweight than non-Muslims, and one found that Muslim women in Bangladesh had significantly higher body mass index (BMI) than non-Muslims. Two studies found that Muslims had lower BMI than non-Muslims, i.e., one study from Israel finding lower BMI among Muslim women compared to Jewish women and one study finding that Muslim female college students in Jordan had lower weight than Christian female students in America. Likewise, one study found that BMI was lowest among Muslim American women who wear traditional Muslim dress and veil compared to non-Muslim American women, and another study found that Muslim and Christian adolescent girls in Israel had roughly equal BMI and both had lower BMI than Druze girls. Again, the research demonstrates no consistent pattern of findings.

Sexual Behavior

Sexual behavior is a private activity among Muslims and carries with it serious moral overtones, given that any sexual activity outside of marriage is forbidden. Thus, Muslims may not readily admit to such behavior, and willingness to do so may be affected by the gender and dress of the person conducting the interview (Blaydes and Gillum 2013). Extramarital sexual activity is of particular importance to health given its relationship to the spread of sexually transmitted diseases, especially HIV. Our systematic review identified only one study prior to 2010 that had examined relationships between religiosity and extramarital sexual behavior in Muslims. A second study compared extramarital sexual activity between Hindu and Muslim male college students in Nepal. We now review both studies below.

Shirazi and Morowatisharifabad (2009) surveyed 200 male college students in Iran, assessing religiosity and self-reported sexual activity. Students were all unmarried or never married, had completed at least 2 years of college, and were Shiite Muslims (age range 20–27). Religious involvement was assessed with a 4-item scale: frequency of prayer, frequency of fasting during Ramadan, talking with others about religious concerns, and frequency of following religious rules. Students were also asked about past sexual relationships, norms about sexual relationships, attitudes toward sexual relationships, and self-efficacy in avoiding sex until married. Of the group, 20 % indicated sexual contact in the past. Religiosity was related to more conservative attitudes toward sex ($p<0.001$), greater self-efficacy in avoiding sex ($p=0.001$), and lower likelihood of past sexual contact ($p<0.001$) (uncontrolled).

Adhikari and Tamang (2009) compared extramarital sexual activity in 573 Hindu and Muslim male students attending 12 colleges in Kathmandu, Nepal. Participants were ages 15–24 years, 88 % unmarried, and most (91 %) had taken a course in school on reproductive health. About half (41 %) lived with family, 19 % alone, and 40 % with friends. Overall, 39 % said they had experienced premarital sexual intercourse. Multivariate analysis indicated that Hindu students were three times more likely than Muslim students to report having had premarital sex (OR = 2.99, $p<0.05$).

Missed Studies. We missed numerous studies in our 2010 review, especially those comparing Muslims and non-Muslims on extramarital sexual activity. Many of these studies were conducted in non-Muslim-majority African countries, so they did not show up in the studies we selected from our 2010 systematic review (which was largely limited to those from Muslim-majority countries). Religion has now become a focus in many studies since it may influence the spread of HIV infection and AIDS in sub-Saharan Africa.

Religiosity. In a study of 858 adults ages 15–59 in rural Senegal, Lagarde and colleagues (2000) examined factors related to protection against AIDS among Muslims (76 %) and Christians. In the overall sample, importance of religion was not related to being faithful to one's spouse or intending to be faithful to protect against AIDs (adjusting for age, education, marital status, religion, and migration status).

However, a number of important AIDS prevention-related variables were less frequent among those who were more religious, such as considering AIDS a major health problem, intending to change behavior to protect against AIDS, and believing that condom use was not forbidden by their religion.

Investigators studying Jewish and Muslim mothers in Israel found a similar negative effect of religion on practices to prevent the consequences of extramarital sexual activity, including the intention to vaccinate their daughters for human papillomavirus (a sexually transmitted virus that leads to cervical cancer) (Ben Natan et al. 2011). Muslims in that study had lower intention to vaccinate their daughters than did Jews. This might be explained by the belief that advocating the use of condoms for protection and vaccination against HPV, while helping to prevent AIDS and cervical cancer, means giving implicit permission to have sexual relations outside of marriage, which is strictly forbidden (haram) in Islam.

In a study previously described, Herzog (2003) examined the relationship of religiosity to perceived seriousness of a wide range of crimes in a random sample of 987 Israeli adults (633 Jews, 198 Arab Muslims). Religiosity was measured by a single item that categorized respondents as secular, religious, or very religious. Among Arab Muslims, who were more likely than Jews to believe that illegal sexual relations was a serious crime, greater religiosity was surprisingly not associated with this belief, as it was among Jews.

Trinitapoli and Regnerus (2006) analyzed data from the second wave of the Malawi Diffusion and Ideational Change Project in rural Malawi ($n = 978$, all men). The largest percentage of any religion in the sample was Muslim (23 %), compared to Pentecostal (20 %), Mission Protestant (19 %), African Independent Church (14 %), Catholic (19 %), and other (5 %). At that time, this was the largest dataset available that had measured religiosity and characteristics related to HIV transmission. Religious affiliation and frequency of religious attendance were assessed, along with several extramarital sexual activity variables: extramarital partner in the past 12 months reporting sexually transmitted infection (STI), likelihood of already being infected with HIV, and likelihood of being infected in the future. Religiosity (attendance at religious services) was significantly and inversely related to having an extramarital partner in the past 12 months and to having an STI.

Mohammadi and colleagues (2006) surveyed a random sample of 1,385 males aged 15–18 in Tehran, Iran, examining correlates of sexual behavior. Most participants (98 %) were Muslim and 79.7 % indicated that they were religious (vs. somewhat religious or not religious). An index of premarital sexual relations was developed based on six questions. Those who were more religious were significantly less likely to have permissive attitudes toward premarital sexual behavior. Similarly, religiosity was significantly and inversely related to having had sexual contact/experience (23.2 % of religious, 43.4 % of somewhat religious, 51.5 % of not religious). A logistic regression model that controlled for other predictors revealed that those who said they were only somewhat or not religious were 64 % more likely to have had sexual contact than those who were religious (OR = 1.64, 95 % CI 0.98–2.73, $p < 0.10$, trend).

Jaafar and associates (2006) surveyed 389 Malaysian and Indonesian adolescents who reported that they had premarital sex at least one time or more (179 boys and 210 girls, ages 13–20). Adolescents were also asked how important religion was in their life and whether they believed in God. Interestingly, 93 % believed in God and 87 % said they believed that God would punish those who did wrong or sinned (as expected in this largely Muslim population). However, 65 % described themselves as *not religious*. Although the relationship between sexual activity and religion or religiosity was not examined, this is a very low rate of religiosity for youth in this part of the world. The finding suggests that religiosity was lower in this group of sexually active adolescents compared to their peers.

Gilbert (2008) examined the influence of Islam on preventing AIDS among 234 Muslim college students in the West African country of Senegal (ages 18–33, 73 % male). Religiosity was assessed using two 6-item scales that focused on Islamic religious beliefs and practices. Results indicated that religiosity was positively related to abstinence from sex ($B = +0.12$, $p < 0.01$). Furthermore, in contrast to previous reports, religiosity was not associated with a lower likelihood of using condoms.

Yasan and associates (2009) examined predictors of premarital sexual behaviors in 638 college students in Turkey (60 % male). Religiosity was measured, but in an atypical fashion. Participants were categorized as "non-religion" (no religious belief), "another religious belief" (practices a religion other than Islam), "non-religiosity" (does not practice acts of Islamic worship but has religious belief), "liberal religiosity" (sometimes performs daily Islamic acts and has religious belief), and "conservative religiosity" (engages in daily Islamic worship). For masturbation, compared to conservative religious Muslims, those who were "non-religion" were 11 times more likely (OR = 10.9, 95 % CI 2.5–47.6); those who were not Muslim were six times more likely (OR = 6.0, 95 % CI 2.4–14.2); and those who were of liberal religiosity were 2.6 times more likely (OR = 2.6, 95 % CI 1.3–5.4). For foreplay/sexual intercourse, compared to those who were conservative religious Muslims, those in the non-religion group were 13 times more likely (OR = 13.4, 95 % CI 3.2–56.0); those who were not Muslim were 16 times more likely (OR = 16.2, 95 % CI 4.7–56.2); and liberally religious were nine times more likely (OR = 8.9, 95 % CI 2.6–29.9). Analyses were controlled for socioeconomic status, living area, sexual orientation, and gender.

Muslims vs. *Non-Muslims*. In the Lagarde et al. (2000) study cited above from Senegal, Muslim men were significantly more likely than Christian men to intend to be (or become) faithful in order to be protected from AIDS (55 % vs. 39 %, $p = 0.01$), although among women, there was no difference between Muslims and Christians. There was also no significant difference between Muslims and Christians among either men or women in percentage that reported casual sex in the past 12 months (in men, 22 % vs. 24 %, and in women, 5 % vs. 5 %).

Addai (2000) examined data from the 1993 Ghana Demographic and Health Survey to explore relationships between religion and premarital sex in 4,562 women ages 15–49. Results indicated that Muslim women in Ghana were least likely to have had premarital sex (57.8 %) compared to Protestants (82.6 %), Catholics (78.9 %), and other Christian participants (76.8 %). Among women who were never married, there was no difference in premarital sex between Muslims and Christians

or those affiliated with other religious groups. However, among currently married or previously married women, Muslims were significantly less likely to report having had premarital sex compared to all other religious groups. Likewise, in the Herzog (2003) study cited above, recall that Muslims were more likely than Jews to feel that illegal sexual relations were a serious crime ($B = +0.18$, $p < 0.05$).

Gray (2004) examined the prevalence of HIV infection in 38 sub-Saharan African countries, correlating it with the percentage of Muslims that made up each country. All countries had a minimum of 1 million inhabitants. Predictors were percentage of Muslims, population density, percentage of urban population, annual per capita purchasing power, and year of first recorded AIDS case. Percentage of the population ages 15–49 with HIV infection was the dependent variable. The statistical model with the five variables above accounted for 69 % of the variance in HIV prevalence. Of the five predictors, however, only two were significantly related to HIV infection rates: percentage of a country's population that was Muslim predicted lower HIV infection rates ($B = -0.52$, $p = 0.0005$) and annual per capita purchasing power predicted higher infection rates ($B = +0.64$, $p = 0.0002$).

In the Trinitapoli and Regnerus (2006) study cited above of 978 men from rural Malawi, Muslims were *more likely* to have an extramarital partner (15.0 % vs. 4.2 % for Pentecostal Christians) and were more likely to report a sexually transmitted infection (21.8 % vs. 7.4 % Pentecostals). When other variables were controlled (religious attendance, previous marriage, age, and region of residence), however, Muslim affiliation was no longer a significant predictor of sexual behavior.

Soldan and colleagues (2007) examined predictors of sexual behavior among a random sample of 715 sexually active men in rural Malawi (surveyed in 2000–2001 for determining HIV risk). The majority of men were Muslim (86.4 %) and the others were mostly Christian (13.6 %). Regression models controlling for age, income, and occupation and migration status revealed that there was no difference between Muslims and Christians in the likelihood of ever having paid for sex or in the use of condoms during sex. However, Muslim men were significantly more likely to have more sexual partners than Christian men ($B = +0.44$, $p < 0.05$), even after controlling for men with more than one wife.

Coleman and Testa (2008) surveyed 3,007 students aged 15–18 attending secondary schools in London, UK, examining sexual knowledge, attitudes, and behaviors. None of the schools were religious schools. Included in the sample were 679 Muslims (26 %), 967 Christians (36 %), 582 Hindus (22 %), and 418 with no religious affiliation (16 %). Prevalence of having had sexual intercourse differed between religious groups. Among males, prevalence was 49.7 % in Christians, 40.9 % in those with no religious affiliation, 30.9 % in Muslims, and 23.9 % in Hindus ($p < 0.001$). Among females, prevalence was 41.3 % among those with no religious affiliation, 34.6 % of Christians, 12.5 % of Hindus, and 9.0 % of Muslims ($p < 0.001$). Christians and Muslim girls were least likely to use contraception (55.0 % and 53.6 %, respectively). Among women, 13.3 % ($n = 39$) reported having gotten pregnant or contracted a sexually transmitted disease, with the majority occurring in Christian girls ($n = 26$).

Koffi and Kawahara (2008) analyzed data on religion and sexual behavior in 3,041 never-married people ages 15–24 living in the Cote d'Ivoire, the country in West Africa with the highest HIV infection rates. The sample was 54 % male, and most participants were either Christian (50.4 %) or Muslim (30.7 %). Sexual abstinence was the main outcome variable. "Primary" abstinence was defined as never having had sexual intercourse, and "secondary" abstinence was defined as having had sex but not within the past 12 months. Results stratified by gender indicated that among abstinent males (primary or secondary), religious affiliation was as follows: 48.2 % Christian, 36.5 % Muslims, and 15.2 % "other" ($p<0.01$). Among women who were abstinent, 53.9 % were Christian, 30.4 % were Muslim, and 15.5 % were "other." Logistic regression was used to control analyses for age, education, place and region of residence, attitude, and AIDS-related knowledge. Among males, those in the "other" religious category (including those with no religion, other religion, and Animists) were significantly less likely than Catholics (the reference group) to engage in sexually abstinent behavior. There were no significant differences in sexual abstinence between Muslims and any Christian group in either males or females, after these other variables were controlled.

Recent Research. We identified four studies that have examined this subject since our 2010 review, two conducted in sub-Saharan African countries.

Religiosity. In a study previously described, Kagimu and colleagues (2011) examined factors related to new HIV infections among 1,224 Muslim youth ages 15–24 (50 % male) attending 30 mosques surrounding a hospital in Uganda. Religiosity was assessed using the Brief Multidimensional Measurement of Religiousness/Spirituality scale (Fetzer Institute). As an objective indicator of religiosity, researchers also determined whether the respondent had a "Sujda" (a spot on forehead due to frequent praying and bowing head to touch ground). High-risk sexual behaviors that increase risk of HIV were assessed. Results indicated that Muslims who had a Sujda were less likely to have ever had sex (66 % vs. 76 % without a Sujda, $p<0.001$, no controls). Likewise, wearing a Muslim cap was associated with a lower risk of having had sex (65 % vs. 77 %, $p=0.01$). Sex outside of marriage was also lower among those with a Sujda (40 % vs. 53 %, $p=0.01$). Having a single lifetime sexual partner (vs. more than one lifetime partner) was also more common among those who watched religious TV regularly (29 % vs. 17 %, $p<0.005$), frequently attended mosque prayers (23 % vs. 16 %, $p=0.02$), frequently participated in other mosque activities (31 % vs. 18 %, $p=0.01$), wore a Muslim cap (24 % vs. 11 %, $p=0.005$), and strongly tried to implement religious teachings (55 % vs. 40 %, $p<0.05$). Using a condom was *positively* associated with several religious activities (watching religious programs, trying hard to love God, participating in mosque activities).

Rahman and associates (2012) examined factors related to premarital sexual activities in 1,032 secondary school students in Kelantan, Malaysia (57 % female, ages 13–17, all Muslim). Religious practice was assessed by a single question that asked about "neglecting religious practice (daily prayers)." Attitude toward premarital sexual activities was the outcome. Results indicated that compared to those who never neglected their daily prayers, those who neglected their daily prayers were

over twice as likely to have permissive attitudes toward premarital sexual activities, after controlling for age, gender, and knowledge (OR = 2.02, 95 % CI 1.49–2.73, $p < 0.001$).

Muslims vs. *Non-Muslims*. Clark (2010) analyzed data from a prospective study of religion and sexual behaviors in Malawi. The sample consisted of 722 married men surveyed in 1998 and again in 2001. Extramarital sexual partnerships (EMSP) were the focus of the study. In both 1998 and 2001, 9 % of men reported having extramarital affairs within the past year. Religious affiliation (in 1998 and 2001) and attendance at religious services (in 2001 only) were both measured. Religious affiliation was categorized as Protestant (52–55 %), Catholic (18 %), Muslim (21–22 %), or "other" (7–8 %). Analyses using logistic regression that controlled for age, education, religious attendance, and socioeconomic status indicated that in 1998, Muslims were *more likely* to have an EMSP compared to Catholics ($B = +1.51$, $p < 0.05$), whereas in 2001, Muslims were *less likely* than Catholics to have an EMSP ($B = -1.27$, $p < 0.05$). Although the percentage of Muslims who made up those having EMSP increased from 24 % in 1998 to 34 % in 2001, the percentage of Catholics increased even more from 10 to 28 % (while Protestants dropped from 59 to 33 %). No explanation for these changes was given.

Finally, Adamczyk and Hayes (2012) analyzed cross-national data from more than 30 mostly developed countries to determine whether the Muslim percentage of a country's population was associated with having sex outside of marriage. Data were available from each country on persons ages 15–64. The analysis for premarital sex focused on the 418,140 who had been married or were currently married, and for extramarital sex, focused on the 327,752 married respondents who were currently married and indicated they had sexual relations within the past year. Religious affiliation was 39 % Christian, 23 % Muslim, 27 % Hindu, 4 % Buddhist, and 2 % no religion. Overall, 53 % of married or ever-married participants indicated that they had experienced premarital sex, whereas only 1 % of currently married respondents admitted to having extramarital sex. At the individual person level, hierarchical logistic regression was used to control for demographic, work, and family variables. Results indicated that Muslims were 53 % less likely than Christians to have had premarital sex (OR = 0.47, $p < 0.001$). At the country level, percentage of the population Muslim was related to a slightly lower likelihood of having premarital sex (OR = 0.98, $p < 0.001$). The same pattern was present for extramarital affairs. Muslims were 45 % less likely than Christians to have had such affairs when married (OR = 0.55, $p < 0.001$), although percentage of Muslims at the country level (after controlling for individual-level relationships) was unrelated to having extramarital affairs.

Summary. At least nine studies have examined the relationship between religiosity and extramarital sexual activity in Muslim-majority populations. Of those, seven (78 %) reported significant inverse relationships (Table 10.1). At least 12 studies have compared Muslims with members of other religious groups, with eight (67 %) finding less extramarital sexual activity in Muslims, one finding greater extramarital sexual activity among Muslims in Malawi, and three reporting no difference or mixed findings between Muslims and those from other religious affiliations. In

general, then, premarital and extramarital sex is less common in Muslims compared to other religious groups. As in Christians, greater religiosity is related to lower rates of premarital and extramarital sex in Muslims. However, under-reporting among Muslims may be an issue given the strong prohibition against such activity. Also, strong beliefs against extramarital sex may lead to resistance against taking measures to prevent the spread of sexually transmitted diseases.

Summary and Conclusions

In general, healthy behaviors are more common and unhealthy behaviors are less common in Muslims who are more deeply religious. First, the research indicates lower rates of cigarette smoking among those who are more religious (seven of ten studies). There is not much difference in smoking behavior between Muslims and other religious groups, although Muslims in general are less likely to smoke (three of eight studies) given the fatwa against smoking. Very little research has examined relationships between religiosity and exercise, diet, or weight among Muslims, although what research exists is not particularly positive, suggesting that this area of health behavior needs improvement. Religious Muslims may view exercise as less of a priority since it takes time away from work, academic pursuits, or religious activity. Socioeconomic factors may also play a role since poorer Muslims may not have time for exercise. The eating habits of Muslims are not always balanced, with strong cultural factors influencing the kind of foods eaten and views toward an ideal body weight, especially for women. Finally, risky sexual activity outside of marriage is inversely related to religiosity among Muslims in the vast majority of studies (seven out of nine) and is also less common in Muslims (compared to other religious groups). However, strong prohibitions against extramarital sexual activity may prevent Muslims from taking precautions to prevent the spread of sexually transmitted diseases.

References

Adamczyk, A., & Hayes, B. E. (2012). Religion and sexual behaviors: Understanding the influence of Islamic cultures and religious affiliation for explaining sex outside of marriage. *American Sociological Review, 77*(5), 723–746.

Addai, I. (2000). Religious affiliation and sexual initiation among Ghanaian women (2000). *Review of Religious Research, 41*(3), 328–343.

Adelekan, M. L., Abiodun, O. A., Imouoklhome-Obayan, A. O., Oni, G. A., & Ogunremi, O. O. (1993). Psychosocial correlates of alcohol, tobacco and cannabis use: Findings from a Nigerian university. *Drug and Alcohol Dependence, 33*, 247–256.

Adhikari, R., & Tamang, J. (2009). Premarital sexual behavior among male college students of Kathmandu, Nepal. *BMC Public Health, 9*, 241.

Afifi Soweid, R. A., Khawaja, M., & Salem, M. T. (2004). Religious identity and smoking behavior among adolescents: Evidence from entering students at the American University of Beirut. *Health Communication, 16*(1), 47–62.

Al-Kandari, Y. Y. (2003). Religiosity and its relation to blood pressure among selected Kuwaitis. *Journal of Biosocial Science, 35*(3), 463–472.
Al-Sahab, B., Tamim, H., Mumtaz, G., Khawaja, M., Khogali, M., Afifi, R., Nassif, Y., & Yunis, K. A. (2008). Predictors of breast-feeding in a developing country: Results of a prospective cohort study. *Public Health Nutrition, 11*(12), 1350–1356.
Bachir, R., & Chaaya, M. (2008). Maternal smoking: Determinants and associated morbidity in two areas of Lebanon. *Maternal and Child Health Journal, 12*(3), 298–307.
Batnizky, A. K. (2011). Cultural constructions of "obesity": Understanding body size, social class and gender in Morocco. *Health & Place, 17*, 345–352.
Ben Natan, M., Aharon, O., Palickshvili, S., & Gurman, V. (2011). Attitude of Israeli mothers with vaccination of their daughters against papilloma virus. *Journal of Pediatric Nursing, 25*, 70–71.
Bharmal, N., Kaplan, R. M., Shapiro, M. F., Kagawa-Singer, M., Wong, M. D., Mangione, C. M., Divan, H., & McCarthy, W. J. (2013). The association of religiosity with overweight/obese body mass index among Asian Indian immigrants in California. *Preventive Medicine, 57*(4), 315–321.
Biddle, S. J. H., & Asare, M. (2011). Physical activity and mental health in children and adolescents: A review of reviews. *British Journal of Sports Medicine, 45*, 886–895.
Blaydes, L., & Gillum, R. M. (2013). Religiosity-of-interview effects: Assessing the impact of veiled enumerators on survey response in Egypt. *Politics and Religion, 6*(3), 459–482.
Bond A (2013). Fattest countries in the world revealed: Extraordinary graphic charts the average body mass index of men and women in every country (with some surprising results). *Mail Online*: *Health*, March 29. Retrieved October 7, 2013, from http://www.dailymail.co.uk/health/article-2301172/Fattest-countries-world-revealed-Extraordinary-graphic-charts-average-body-mass-index-men-women-country-surprising-results.html
Bonne, K., Vermeir, I., Bergeaud-Blackler, F., & Verbeke, W. (2007). Determinants of halal meat consumption in France. *British Food Journal, 109*, 367–386.
Bradby, H., Williams, R., Bradby, H., & Williams, R. (2006). Is religion or culture the key feature in changes in substance use after leaving school? Young Punjabis and a comparison group in Glasgow. *Ethnicity & Health, 11*(3), 307–324.
Chaturvedi, H., Phukan, R., & Mahanta, J. (2003). The association of selected sociodemographic factors and differences in patterns of substance use: A pilot study in selected areas of Northeast India. *Substance Use & Misuse, 38*(9), 1305–1322.
Clark, S. (2010). Extra-marital partnerships and male friendships in rural Malawi. *Demographic Research 22*,1–28.
Cohen, M., & Azaiza, F. (2007). Health-promoting behaviors and health locus of control from a multicultural perspective. *Ethnicity & Disease, 17*(4), 636–642.
Coleman, L. M., & Testa, A. (2008). Sexual health knowledge, attitudes and behaviors: Variations among a religiously diverse sample of young people in London, UK (2008). *Ethnicity & Health, 13*(1), 55–72.
Dima-Cozma, C., & Cozma, S. (2012). Religion and medicine or the spiritual dimension of healing. *Journal for the Study of Religions and Ideologies, 11*(Spring), 31–48.
Divsalar, K., Nejadnaderi, S., Nakhaee, N., & Rouhani, S. (2010). Religious attitude associated with general health and smoking in Iranian students. *Journal of Addiction and Health, 2*(1–2), 1–7.
Dunkel, T. M., Davidson, D., & Qurashi, S. (2010). Body satisfaction and pressure to be thin in younger and older Muslim and non-Muslim women: The role of Western and non-Western dress preferences. *Body Image, 7*, 56–65.
Fatoye, F. O. (2003). Psychosocial correlates of substance use amongst secondary school students in south western Nigeria. *East African Medical Journal, 80*(3), 154–158.
Ford, E. S., Bergmann, M. M., Kroger, J., Schienkiewitz, A., Weikert, C., & Boeing, H. (2009). Healthy living is the best revenge: Findings from the European prospective investigation into cancer and nutrition-Potsdam study. *Archives of Internal Medicine, 169*, 1355–1362.
Ghouri, N., Atcha, M., & Sheikh, A. (2006). Influence of Islam on smoking among Muslims. *British Medical Journal, 332*, 291–294.

Gilbert, S. S. (2008). The influence of Islam on AIDS prevention among Senegalese university students. *AIDS Education and Prevention, 20*(5), 399–407.

Gray, P. B. (2004). HIV and Islam: Is HIV prevalence lower among Muslims? *Social Science & Medicine, 58*, 1751–1756.

Herzog, S. (2003). Religiosity and perceptions of crime seriousness by Jewish and Muslim respondents in Israel. *Deviant Behavior, 24*, 153–174.

Hossain, M. G., Bharati, P., Aik, S., Lestrel, P. E., Abeer, A., & Kamarul, T. (2012). Body mass index of married Bangladeshi women: Trends and association with socio-demographic factors. *Journal of Biosocial Science, 44*(4), 385–399.

Islam, S. M. S., & Johnson, C. A. (2003). Correlates of smoking behavior among Muslim Arab-American adolescents. *Ethnicity & Health, 8*(4), 319–337.

Jaafar, J., Istiqomah, W., & Afiatin, T. (2006). The relationship between religiosity, youth culture, and premarital sex among Malaysian and Indonesian adolescents. *Asia Pacific Journal of Social Work and Development, 16*(2), 5–18.

Kagimu M, Guwatudde D, Rwabukwali C, Kaye S, Walakira Y, Ainomugisha D (2011). Religiosity for promotion of behaviors likely to reduce new HIV infections in Uganda: A study among Muslim youth in Wakiso district. Journal of Religion and Health, December 28 [E-pub ahead of print] DOI 10.1007/s10943-011-9563-8

Kahan, D. (2003). Islam and physical activity: Implications for American sport and physical education. *Journal of Physical Education, Recreation & Dance, 74*(3), 48–54.

Kahan, D. (2007). Overweight and its relationship to Middle Eastern American college students' sociodemographics and physical activity. *Research Quarterly for Exercise and Sport, 78*(3), 248–256.

Kahan, D. (2009). Quantity, type, and correlates of physical activity among American Middle Eastern university students. *Research Quarterly for Exercise and Sport, 80*, 412–423.

Kalter-Leibovici, O., Chetrit, A., Lubin, F., Atamna, A., Alpert, G., Ziv, A., Abu-Saad, K., Mura, H., Eilat-Adar, S., & Goldbourt, U. (2011). Adult-onset diabetes among Arabs and Jews in Israel: A population-based study. *Diabetic Medicine, 29*(6), 748–754.

Kamal, S. M. M., Islam, M. A., & Rahman, M. A. (2011). Sociopsychological correlates of smoking among male university students in Bangladesh. *Asia-Pacific Journal of Public Health, 23*, 555–567.

Khader, Y. S., & Alsadi, A. A. (2008). Smoking habits among university students in Jordan: Prevalence and associated factors. *Eastern Mediterranean Health Journal, 14*(4), 897–904.

Khan, M. M., Aklimunnessa, K., Kabir, M. A., Kabir, M., & Mori, M. (2006). Tobacco consumption and its association with illicit drug use among men in Bangladesh. *Addiction, 101*(8), 1178–1186.

Khan, M. M., Khan, A., Kraemer, A., & Mori, M. (2009). Prevalence and correlates of smoking among urban adult men in Bangladesh: Slum versus non-slum comparison. *BMC Public Health, 9*, 149.

Knoops, K. T., de Groot, L. C., Kromhout, D., Perrin, A. E., & Moreiras-Varela, O. (2004). Mediterranean diet, lifestyle factors, and 10-year mortality in elderly European men and women: The HALE project. *Journal of the American Medical Association, 292*, 1433–1439.

Koffi, A. K., & Kawahara, K. (2008). Sexual abstinence behavior among never-married youths in a generalized HIV epidemic country: Evidence from the 2005 Cote d'Ivoire AIDS indicator survey. *BMC Public Health, 8*, 408.

Kvaavik, E., Batty, G. D., Ursin, G., Huxley, R., & Gale, C. R. (2010). Influence of individual and combined health behaviors on total and cause-specific mortality in men and women: The United Kingdom Health and Lifestyle Survey. *Archives of Internal Medicine, 170*, 711–718.

Lagarde, E., Enel, C., Seck, K., Gueye-Ndiaye, A., Piau, J. P., Pison, G., Delaunay, V., Ndoye, I., & Mboup, S. (2000). Religion and protective behaviors towards AIDS in rural Senegal. *AIDS, 14*, 2027–2033.

Latzer, Y., Azaiza, F., & Tzischinsky, O. (2009). Eating attitudes and dieting behavior among religious subgroups of Israeli-Arab adolescent females. *Journal of Religion and Health, 48*, 189–199.

Lee, C. D., Sui, X., & Blair, S. N. (2009). Combined effects of cardiorespiratory fitness, not smoking, and normal waist girth on morbidity and mortality in men. *Archives of Internal Medicine, 169*, 2096–2101.

Lerner-Geva, L., Boyko, V., Blumstein, T., & Benyamini, Y. (2010). The impact of education, cultural background, and lifestyle on symptoms of the menopausal transition: The Women's Health at Midlife Study. *Journal of Women's Health, 19*, 975–985.

Merom, D., Sinnreich, R., Aboudi, V., Kark, J. D., & Nassar, H. (2012). Lifestyle physical activity among urban Palestinians and Israelis: A cross-sectional comparison in the Palestinian-Israeli Jerusalem Risk Factor Study. *BMC Public Health, 12*, 90.

Mohammadi, M. R., Mohammad, K., Farahani, F. K., Alikhani, S., Zare, M., Tehrani, F. R., Ramezankhani, A., & Alaeddini, F. (2006). Reproductive knowledge, attitudes and behavior among adolescent males in Tehran, Iran. *International Family Planning Perspectives, 32*(1), 35–44.

Muhamad, N., & Mizerski, D. (2013). The effects of following Islam in decisions about taboo products. *Psychology & Marketing, 30*, 357–371.

Naing, N. N., & Ahmad, Z. (2001). Factors related to smoking habits of male secondary school teachers. *Southeast Asian Journal of Tropical Medicine & Public Health, 32*(2), 434–439.

Nakhaee, N., Divsalar, K., & Jadidi, N. (2009). Religious involvement and cigarette smoking among Iranian university students. *International Journal of Psychiatry in Medicine, 39*(2), 189–198.

Ozcan, Y. Z., & Ozcan, K. M. (2002). Determinants of youth smoking—Evidence from Turkey. *Substance Use & Misuse, 37*(3), 313–336.

Pampel, F. C. (2005). Patterns of tobacco use in the early epidemic stages: Malawi and Zambia, 2000–2002. *American Journal of Public Health, 95*(6), 1009–1015.

Penedo, F. J., & Dahn, J. R. (2005). Exercise and well-being: A review of mental and physical health benefits associated with physical activity. *Current Opinion in Psychiatry, 18*(2), 189–193.

Perk, G., Ghanem, J., Aamar, S., Ben-Ishay, D., & Bursztyn, M. (2001). The effect of the fast of Ramadan on ambulatory blood pressure in treated hypertensives. *Journal of Human Hypertension, 15*(10), 723–725.

Rahman AA, Rahman RA, Ibrahim MI, Ali SH, Salleh H, Muda WAMW (2012). Factors associated with attitude toward premarital sexual activities among school-going adolescents in Kelantan, Malaysia. Asia-Pacific Journal of Public Health

Regenstein, J. M., Chaudry, M. M., & Regenstein, C. E. (2003). The kosher and halal food laws. *Comprehensive Reviews in Food Science and Food Safety, 2*(3), 111–127.

Rguibi, M., & Belahsen, R. (2006). Fattening practices among Moroccan Sharawi women. *Eastern Mediterranean Health Journal, 12*, 619–624.

Shirazi, K. K., & Morowatisharifabad, M. A. (2009). Religiosity and determinants of safe sex in Iranian non-medical male students. *Journal of Religion and Health, 48*(1), 29–36.

Soldan, V. A. P., deGraft-Johnson, J. E., Bisika, T., & Tsui, A. O. (2007). Social, economic and demographic determinants of sexual risk behaviors among men in rural Malawi: A district-level study. *African Journal of Reproductive Health, 11*(2), 33–46.

Tahlil, T., Woodman, R. J., Coveney, J., & Ward, P. R. (2013). The impact of education programs on smoking prevention: A randomized controlled trial among 11 to 14 year olds in Aceh, Indonesia. *BMC Public Health, 13*, 367.

Trinitapoli, J., & Regnerus, M. D. (2006). Religion and HIV risk behaviors among married men: Initial results from a study in rural Sub-Saharan Africa. *Journal for the Scientific Study of Religion, 45*(4), 505–528.

Vucina, T., & Becirevic, I. Z. (2007). Risk factors and protective factors for adolescent substance use. *Review of Psychology, 14*, 59–72.

Walseth, K., & Fasting, K. (2003). Islam's view on physical activity and sport Egyptian women interpreting Islam. *International Review for the Sociology of Sport, 38*(1), 45–60.

Williams, E. D., Nazroo, J. Y., Kooner, J. S., & Steptoe, A. (2010). Subgroup differences in psychosocial factors relating to coronary heart disease in the UK South Asian population. *Journal of Psychosomatic Research, 69*, 379–387.

Woofenden, H. (2012). A call to prayer: A cross-cultural examination of religious faith, modesty, and body image. *Undergraduate Review, 8*(article 15), 81–87.

Yasan, A., Essizoglu, A., & Yildirim, E. A. (2009). Predictor factors associated with premarital sexual behaviors among university students in an Islamic culture. *International Journal of Sexual Health, 21*, 145–152.

Yong, H. H., Hamann, S. L., Borland, R., Fong, G. T., & Omar, M. (2009). Adult smokers' perception of the role of religion and religious leadership on smoking and association with quitting: A comparison between Thai Buddhists and Malaysian Muslims. *Social Sciences in Medicine, 69*(7), 1025–2031.

Yong HH, Savvas S, Borland R, Thrasher J, Sirirassamee B, Omar M (2013). Secular versus religious norms against smoking: Which is more important as a driver of quitting behaviour among Muslim Malaysian and Buddhist Thai smokers? *International Journal of Behavioral Medicine, 20*(2), 252–258.

Zohrabian, A., & Philipson, T. J. (2010). External costs of risky health behaviors associated with leading actual causes of death in the U.S.: A review of the evidence and implications for future research. *International Journal of Research in Public Health, 7*, 2460–2472.