SSM - Population Health 15 (2021) 100843

Contents lists available at ScienceDirect

SSM - Population Health

journal homepage: www.elsevier.com/locate/ssmph

# Muslim religiosity and health outcomes: A cross-sectional study among muslims in Norway

Bushra Ishaq [a,*], Lars Østby [b], Asbjørn Johannessen [c]

[a] University of Oslo and MF Norwegian School of Theology, Religion and Society, Norway
[b] Statistics Norway, Norway
[c] Oslo Metropolitan University, Norway

ARTICLE INFO

*Keywords:*
Muslim religiosity
Religious practice
Muslim
Minority
Health indicators
Health outcomes

ABSTRACT

The aim of this study is to address the association between Muslim religiosity and health outcomes, and investigate if religious Muslims are more likely to be of disadvantage of health than non-religious Muslims.

A cross-sectional study-design is used with a representative sample of Muslims in Norway including 2661 respondents in age 16 years–74 years from the "The Survey On Living Conditions Among Persons With An Immigrant Background 2016", conducted by Statistics Norway. Multivariate logistic regression analyses were conducted to investigate the relationship between Muslim religiosity and health outcomes. The health outcomes in focus are self-reported health, diabetes, cardiovascular diseases, neck and back illnesses, mental health problems, sleeping disorders, consumption of alcohol, and smoking.

Association between Muslim religiosity and positive health outcomes were found. Smoking and alcohol consumption were negatively associated with Muslim religiosity.

The findings suggest no evidence that religious Muslims are more likely than non-religious Muslims to be of disadvantage of health, and the study do not support the premise that Islam as a barrier to health. In addition, our findings suggest that Muslim religiosity might serve as a resource either predicting better health outcomes or that Muslim religiosity may be a factor that exists if good health is evident. As our findings cannot define any cause-effect relation between Muslim religiosity and health outcomes, given the cross-sectional design of the study, we emphasize the need of further research that investigates how Muslim religiosity is associated to health.

## 1. Introduction

Individuals originating from Muslim countries and living in western countries seem to be of disadvantage with regard to health as they are among the immigrants that report of worse health (Inhorn & Serour, 2011; Johnston & Lordan, 2012; Vrålstad & Wiggen, 2017). Latif and colleagues (2015) found poor prognosis for breast cancer among women originating from Muslim countries. Although, also women originating from Sri Lanka had poor prognosis compared to the control group, it was women originating from Somalia that had the worse prognosis with a 50 percent mortality rate compared to ethnic Norwegian women who had a mortality rate of 7,9 percent. Less participation in the national screening program and time of diagnosis have been suggested as the main explanatory variables for the higher mortality rate. Based on a systematic literature review, Samari et al. (2018) concluded that discrimination of Muslims due to their faith, impair their mental and physical health. The "healthy migrant effect", an empirically observed mortality advantage of migrants relative to the majority population in the host countries, is shown to disappear among second generation male immigrants originating from Muslim countries (Guillot et al., 2019).

Although there is a significant difference in attitudes towards Muslims, Islamophobia is growing globally (Bangstad, 2014; Considine, 2017). The field of medicine and health care seems not to be an exception in this regard (Helsetilsynet, 2019; Martin, 2015; McIntosh, 2015). Articles registered in Medline predominantly portray Muslims in negative ways; claiming that Muslim religiosity has a negative effect on health and that Muslims need modernization and assimilation (Laird et al., 2007). Anti-Muslim views have become even more prevalent during the Covid-19-pandemic (Chib, 2020). Although there are data indicating that minorities, including Muslims living in Western countries, are of higher risk of Covid-19, there is no evidence that this is due to specific Islamic beliefs, but rather due to low socioeconomic status,

* Corresponding author.
*E-mail addresses:* bushra.ishaq@medisin.uio.no (B. Ishaq), lars.ostby@ssb.no (L. Østby), asbjorn@oslomet.no (A. Johannessen).

https://doi.org/10.1016/j.ssmph.2021.100843
Received 15 December 2020; Received in revised form 7 June 2021; Accepted 8 June 2021
Available online 11 June 2021

possible genetic predispositions and comorbidity (Abuelgasim et al., 2020; Ishaq et al., 2021; Rose et al., 2020). Despite this, Muslims have been blamed for the epidemic spread of the covid-19 virus in several countries, also in Norway (Brandvold, 2021, pp. 10–11; Ishaq et al., 2021). In some cases, as in India health officials and health care professionals have participated in blaming the Muslim population (Brandvold, 2021, pp. 10–11; Pandey, 2020). Hence, there seems to be a change with regard to Anti-Muslim views. While Anti-Muslim views usually are linked to conspiracy theories and to the spread as fake news (such as videos of Muslims spitting on non-Muslims to spread the virus) through social media (Leidig, 2020); it may also involve a more collective blame on Muslims as a minority group deliberatively spreading COVID-19 in communities. And anti-Muslim attitudes are also evident among health care professionals. (Helsetilsynet, 2019; Pandey, 2020). Although attitudes regarding religiosity as a causal factor of disadvantage of health among Muslims are evident in several societies, scientific evidence of that is lacking. In order to define Islam as a predictor of health disparities among Muslims, knowledge about how Islam is related to health and determinants of health is needed.

### 1.1. Religion and health

Impact of religion may be difficult to fully differentiate from race and ethnicity, something which is indicated by the tendency to label individuals originating from Muslim majority countries as practicing Muslims. However, religion may contribute to specific values, and practices that may not only influence understanding of illness, but also health seeking behavior and medical compliance (Padela & Curlin, 2013). In this study we intend to address the question whether Muslims that are adherent to Islamic practice and faith are different in regard to health and health behavior than non-religious Muslims. For this reason, it is important to differentiate between individuals who define themselves as Muslims and individuals who might be conceptually affiliated to Islam through the country of origin, as e.g being born in or having parents born in a Muslim majority country. In Norway, where this study has been conducted, only 75 percent of individuals with origin from a Muslim country defined themselves as practicing Muslims according to an another study among Muslims in Norway. Individuals orginating from Muslim countries. but whom do not define themselves as Muslims anymore, are also reported to be quite critical to Islamic practice and faith (Ishaq, 2017).

Religion has been defined as a social determinant of health (Kawachi, 2019). Several studies show a positive association between Muslim religiosity and higher subjective wellbeing, satisfaction, preventive health behavior, and mental health (Abdel-Khalek, 2014; Hassan, 2015; Saleem & Saleem, 2020). A systematic review of 31 studies concluded with a positive association between Islamic faith and happiness (Rizvi & Hossain, 2017). Islamic-based psychotherapy has shown to speed up the recovery among Muslims who are ill (Townsend et al., 2002). A positive association between Islamic practice and better physical health has also been found (Saquib et al., 2017). Another study found religiosity to protect against dysfunctional consequences of work-related stress among Muslim immigrants in North America (Jamal & Badawi, 1993). Muslim religiosity has also been hypothesized as being protective against suicide because of the low suicide rate among Muslims, and a negative association between Muslim religiosity and suicide attempts has also been found (Gearing & Alonzo, 2018). A question yet to be addressed is how Muslim religiosity and health is associated among Muslims in a Western context, and notably, in a representative sample of Muslims. Based on previous research we suggest that Islam could be related to health in two opposing ways: 1) Muslim religiosity may be a predictor of poor health, given the negative way non-Muslim majority populations perceive the religion, making Muslims more vulnerable for discrimination and hate crime. This may not only create a barrier in access to health care services, but also affect determinants of health such as access to employment. There may also be several other negative downsides of religious affiliation, such as negative coping mechanism or content of what is preached in a religious community (Kawachi, 2019). 2) Muslim religiosity may contribute to positive health outcomes through its health promoting teaching, thus impacting not only behavioral factors such as alcohol consumption, but also psychosocial factors through positive coping mechanisms such as putting trust in God, and by religious attendance through social networks.

### 1.2. Purpose of the study

The purpose of this study is to study associations between Muslim religiosity and health by investigating if the non-religious Muslims are more likely to have better health than religious Muslims. No study, to our knowledge, has investigated the association between the multiple dimensions of Muslim religiosity and health indicators in a representative sample. Our study aims to fill this gap. Our null hypothesis is that there is an association between Muslim religiosity and negative health outcomes. We believe that understanding how Muslim religiosity is associated with health is necessary for a more evidence-based approach to Muslim religiosity within the field of health care and medicine, especially in a minority context. Norway is an interesting case in that respect: 1) Muslims constitute a religious minority in Norway as in many other Western countries.

2) Anti-Muslim attitudes, including attitudes regarding Muslim religiosity as a threat to health, are increasing in countries with Muslim minorities. 3) Health disparities between Muslims and the majority population in these countries are significant. 4) Since Norway has better national statistics (better coverage of health register data) than many other western countries, this study may be informative also beyond Norway.

## 2. Method

### 2.1. Study design and sample

A cross-sectional study design is used on a representative sample of Muslims.

The dataset used is from the “The Survey On Living Conditions Among Persons wWith An Immigrant Background 2016”conducted by Statistics Norway (Holmøy & Wiggen, 2017; Vrålstad & Wiggen, 2017). On a regular basis, Statistics Norway conducts a national survey on living conditions among immigrants in Norway and their descendants. The survey illuminates a wide range of topics, and the questions in the survey are largely similar to the national survey on living conditions among the general population which has been conducted regularly since first time in 1973 (Statistics Norway, 1999). Questions are developed in close cooperation with statisticians from a wide range of countries, and they are now in line with the EU-SILC. Some of the elements used in this paper, are based on the European Value Survey. The results are included also in data bases in OECD and Eurostat (European Social Survey, 2018). Results from the survey have been published by Statistics Norway and the Norwegian Institute of Public Health (Kjøllesdal et al., 2019; Vrålstad & Wiggen, 2017). However, these studies have neither distinguished Muslim immigrants from other immigrants, nor have associations between health and religious affiliation been investigated. This dataset has been anonymized after Statistics Norway had collected the data. A notification to the Norwegian Centre for Research Data (NSD) has been made for the use of the sample, and the study is conducted according to NSD’s regulations.

The sample was drawn from the Norwegian Central Population Register (CPR). This register has a very high quality (complete coverage of the resident population of Norway, with high quality of the variables). The high quality is due to the fact that every person with a legal right to stay in Norway needs to be registered there, with their unique Personal identification number (PIN-code). This code is needed for having a driving license, access to health care, schools and education, a bank

account, access to work etc. The PIN-code can be used for linking a wide range of official registers for statistical and scientific purposes. The CPR contains demographic information, for this article country of birth and parental country of birth is particularly relevant. The gross sample is drawn with a known probability to obtain the desired number of persons to be approached for interview. In that way, the gross sample will be representative for the population. The net sample consists of those who successfully completed the interview. Selective non-response might cause non-representativity of the net sample. To reconstruct representativity, the net sample was weighted according to known differences between the net sample and the population. To counteract the non-representativity "The Survey On Living Conditions Among Persons With An Immigrant Background 2016"oversampled groups with known high non-response, to obtain enough observations for each group.

### 2.2. Participants

The participants in our analysis is recruited from two samples, who was presented with two questionnaires, but with identical questions as far as those used in our analyses are concerned. The first sample consists of immigrants with background from twelve different countries of origin, defined as born abroad with two foreign-born parents and four foreign-born grandparents, of age between 16 and 74 years, and having lived in Norway for at least 2 years. The group of countries included were among the largest and growing immigrant groups in Norway; Poland, Turkey, Bosnia- Hercegovina, Kosovo, Eritrea, Somalia, Afghanistan, Sri Lanka, Iraq, Iran, Pakistan, and Vietnam. The second sample included persons born in Norway with two immigrant parents. The respondents were in age 16–39 years, and their parents were born either in Turkey, Sri Lanka, Pakistan or Vietnam, the only countries with large enough number of descendants to be included in a survey like this.

10142 individuals were randomly selected to be invited to participate in the survey. Data was collected by face-to-face or telephone interviews between October 2015 and July 2016. The questionnaires were translated to all main languages in the countries of origin, and the immigrants were offered an interviewer with full knowledge of their mother tongue. They were also offered to conduct the interview in English or Norwegian. Slightly less than 50 per cent preferred Norwegian. The descendants were only offered Norwegian. The total number of participants was 5484, yielding a response rate of 54,1 percent. More details about the sample and data-collection are elaborated in two reports from Statistics Norway (Holmøy & Wiggen, 2017; Vrålstad & Wiggen, 2017). Muslims accounted for 2661 respondents after a data selection from the two samples. The data selection had to meet two criteria; 1) individuals that reported to have been raised in Islamic faith, and 2) who reported to belong to Islam when the interviews were conducted. Individuals originating from Muslim countries, but who did not define themselves as Muslims anymore were excluded from the analysis given the aim of this study; to investigate the association between Muslim religiosity and health indicators. Hence, respondents with conceptual affiliation were necessary to exclude.

### 2.3. Variables

The independent variables measured Muslim religiosity and consisted of the following variables representing intrinsic and extrinsic religiosity: 1) Respondents were asked of importance of religion and the answer was given in a scale (0-10), higher scores indicated greater importance of Islam. 2) Frequency of religious attendance during the last 12 months was measured through a scale (1–6), which was recoded so that higher scores gave most frequent attendees.

The health indicators in this study were selected with regard to prevalence and risk of certain illnesses among minorities in Norway (Kjøllesdal et al., 2019). The dependent variables were the following health indicators:

1) Self-reported health was measured by asking the respondents to consider their health to be very good, good, neither good nor poor, poor or very poor. The two first options were categorized as having good health, while the others were grouped as not having good health.

Although self-reported health is a subjective measurement, it has been shown to be strongly associated with objective parameters of health such as mortality (Idler & Benyaminini, 1997; Doiron et al., 2015).

2) Respondents were asked whether they during the past 12 months had had diabetes. Answers were given as yes or no. 3) Respondents were asked whether they during the past 12 months had had hypertension, angina pectoris, myocardial infarction or cerebrovascular diseases. Answers were given as yes or no. There were separate questions for each of the diseases, but the diseases were further grouped into one variable in this study. Respondents who answered yes on at least one of the diseases were defined to have cardiovascular disease including hypertension. 4) Prolapsed disc sciatica, congenital spine and neck abnormalities and -diseases during the past 12 months were reported as yes or no. These diseases were also grouped into one variable, and respondents reporting of at least one of the diseases were defined to have neck or back illness. 5) Mental health problems were measured using 5 item Hopkins Symptoms Checklist Scale (HSCL) (Strand et al., 2003) including symptoms of nervousness or shakiness inside, feeling fearful, feeling hopeless about the future, feeling blue, worrying too much about things. Each symptom was reported on a four-point scale, and must have occurred during the last 14 days. Mean value over two was coded as mental health problems. 6) Sleeping disorders during the last 14 days were also assessed by questions from HSCL, and had a scale (1–4). The two highest scores (some or very much of sleeping problems) were coded as sleeping disorder. 7) Alcohol consumption was assessed by a question asking respondents if they consumed alcohol or not (yes or no) during the past 12 months. 8) Smoking was also assessed by questioning respondents if they smoke or not (yes or no). Confounders were identified through literature review and by DAGitty: age, gender, nativity, education, employment status and self-reported financial situation is also included. The three latter variables represent socioeconomic status (SES).

### 2.4. Statistical analysis

The SPSS program version 26 was used to conduct the analyses. Descriptive statistical analysis was used. Respondents who chose not to answer, and missing data patterns were studied for each variable before being excluded in the analysis. Given that there were low numbers of missing items, imputation was not considered as necessary. As this is the first study to investigate associations between Muslim religiosity and health in representative samples of Muslims in Norway, our aim was to study this association broadly by including several health indicators. Multivariate logistic regression analyses were conducted to investigate the relationship between Muslim religiosity and health outcomes controlling for covariates. Various logistic regression with interaction effect between gender and variables for Muslim religiosity was also conducted. Result of the Hosmer and Lemeshow test, which was used to estimate the goodness of fit of the model, were not significant indicating that the predicted values are a good fit compared to the observed data.

## 3. Theory

In this paper we use structural theory which concerns how the knowledge and beliefs that exist within a social community impact the actions of the members through collective learning. The communities may not only inform their members about the values, practices and traditions the community is adherent to, but may also create their own consciousness in such a way that the members of the community become susceptible to the knowledge, values and understanding the community perceives. This is also in the nature of religion, as the aim of religion is basically to provide guidance to their adherents through specific

teaching about practices, often offering teaching on how to prioritize one particular practice instead of other practices (Mpofu, 2018). Islam is often regarded to be a religion of practices, given several mandatory religious duties such as five daily prayers, fasting during the holy month of Ramadan, and giving charity. Muslims often explain it by defining their religion as a lifestyle with teaching on every aspects of life (Ishaq, 2017).

Religion may impact health of its adherents through a social mediation of health values that aligns with the particular teaching of the religion. The levels at which a religious community may impact their followers are defined thus within the framework of structural theory are latent, interpretative and elective. Religious identity is a latent tool for the obligation to follow practices in compliance with the religious teaching so as to upheld the social reputation within the community. This specific behavior may also have an implication on health choices and may function on a normative, coercive and mimetic level. Normative rules may be adapted by participating in the community, and may consist of unwritten norms within the community. Mandatory religious teaching and practices consist of the coercive rules. Mimetic rules are acquired by the actions or behavior of other participants of the community, and may serve as examples to be followed or that the adherent seek a behavior that aligns with other adherents of the community (Mpofu, 2018). In this study we take into account all the three levels that a religious community may impact their adherent, by addressing different dimensions of Muslim religiosity. Islamic teaching specifically promotes health behavior and is encouraging healthy practices as personal hygiene and cleanliness of food. (Inhorn & Serour, 2011). To preserve health and well-being is regarded as a religious duty and as a way of praising God in Islam (Tey et al., 2018).

## 4. Results

After excluding respondents who did not regard themselves as adherent to Islam, Muslims accounted for 2661 respondents of a total sample population of 5484 immigrants and descendants (see Table 1).

In Table 2 we provide the odds ratio from logistic regressions predicting health outcomes with importance of Islam as an independent variable. Associations between importance of Islam and smoking, and between importance of Islam and alcohol were statistically significant in all the four models. Odds for not smoking was 12 percent less (for each unit-change) among respondents who regarded Islam as important in the unadjusted model (Model 1). In the unadjusted model we could not find any statistically significant association between importance of Islam and other health outcomes. In the models adjusted for age and gender (Model 2) and age, gender and nativity (Model 3) the odds for diabetes was 1 percent higher(for each unit-change) among respondents who regarded Islam as important versus those who did not. The association between importance of Islam and odds of having diabetes became, however, non-significant when we also adjusted for the socioeconomical variables (Model 4).

In model 4 associations between importance of Islam and reported general health as good, mental health problems, and sleeping disorders became statistically significant. Odds ratio for good health was significantly higher than 1, showing that respondents who regarded Islam as important had 4 percent higher odds (for each unit-change) for reporting good health. Odds for reporting sleeping disorders and mental health problems was respectively 8 percent and 6 percent less (for each unit-change) among respondents that regarded Islam as important in their lives.

Odds ratio between religious attendance and all the health outcomes, except diabetes and good health, were statistically significant in all the models (See Table 3). Adjusted OR for age, gender, nativity for diabetes was significant with 10 percent higher odds (for each unit-change) for reporting of diabetes among respondents who reported of higher religious attendance, but the association between diabetes and religious attendance became statistically insignificant when adjusted for all the covariates including SES. Religious attendance is, when controlled for all the covariates (for each unit-change), associated with 10 percent greater probability of reporting good health, 9 percent less odds of reporting of neck and back illness, 11 percent less odds for reporting of cardiovascular diseases, 13 percent less odds of sleeping disorders and 11 percent less odds of reporting of mental health problems. Odds of smoking and consuming alcohol was also less among respondents who reported of religious attendance in the unadjusted model as well is in the adjusted models. However, odds was lowest in the model adjusted for all

**Table 1**
Descriptive statistics are presented in percent, except age. Percent are given in parenthesis.

| | Male N (Percent) | Female N Percent) | Total |
|---|---|---|---|
| Age group | | | |
| 16–24 years | 350 (24%) | 260 (21%) | 610 (23%) |
| 25–44 years | 708 (49%) | 679 (56%) | 1387 (52%) |
| 45–66 years | 354(25%) | 270(22%) | 624 (23%) |
| 67–74 years | 27 (2%) | 13 (1%) | 40 (2%) |
| **Nativity (nr 423)** | | | |
| Born in Norway | 251 (17%) | 219 (18%) | 472 (18%) |
| Born abroad | 1188 (83%) | 1003 (82%) | 2191 (82%) |
| **Education** | | | |
| No education | 30 (2%) | 51(5%) | 81(4%) |
| Primary and lower secondary school | 638(50%) | 502 (47%) | 1140 (49%) |
| Upper secondary school | 355 (28%) | 278(26%) | 633 (27%) |
| University education or university college education | 255(20%) | 234 (22%) | 289 (21%) |

**Table 2**
Odds ratio and 95% confidence interval for health outcomes with importance of Islam as independent variable. Model 1: unadjusted for other variables. Model 2: each variable is adjusted for age and gender. Model 3: each variable is adjusted for age, gender, nativity. Model 4: each variable is adjusted for age, gender, nativity, education, employment and financial situation *P value is significant at the 0.05 level (2-tailed). **P value s significant at the 0.01 level (2-tailed).

| | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
| **Good health** | 1,01 (0,97-1,04) | 1 (0,96-1,04) | 0,99 (0,96-1,04) | 1,04* (1,0–1,1) |
| **Diabetes** | 1,07 (0,99-1,15) | 1,01* (1,01-1,2) | 1,01* (1,01- | 1,07 (0,98-1,2) |
| **Neck or Back illness (prolapsed disc, sciatica, congenital spine and neck abnormalities, neck diseases)** | 0,97 (0,94-1,01) | 0,98 (0,94-1,02) | 0,98 (0,95-1,02) | 0,97 (0,93-1,01) |
| **Cardiovascular diseases including Hypertension** | 0,97 (0,91-1,01) | 0,97 (0,92-1,02) | 0,97 (0,92-1,02) | 0,96(0,91-1,02) |
| **Sleep disorder** | 0,96 (0,92-1,01) | 0,96 (0,92-1) | 0,96 (0,91-1) | 0,92** (0,88-0,96) |
| **Mental health problems** | 0,97 (0,93-1,01) | 0,97 (0,93-1,01) | 0,97 (0,94-1,01) | 0,94** (0,91-0,98) |
| **Smoking** | 0,88** (0,85-0,92) | 0,9 ** (0,87-0,93) | 0,9 ** (0,87-0,93) | 0,89** (0,86-0,93) |
| **Alcohol** | 0,67** (0,65-0,70) | 0,66 ** (0,64-0,69) | 0,66** (0,64-0,69) | 0,66** (0,64-0,70) |

**Table 3**
Odds ratio and 95% confidence interval for health outcomes with religious attendance as independent variable. Model 1: unadjusted for other variables. Model 2: each variable is adjusted for age and gender. Model 3: each variable is adjusted for age, gender, nativity. Model 4: each variable is adjusted for age, gender, nativity, education, employment and financial situation *P value is significant at the 0.05 level (2-tailed). **P value s significant at the 0.01 level (2-tailed).

| | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
| **Self-evaluated health** | 1,1** (1,05-1,16) | 1,04 (0,99-1,1) | 1,01 (0,98-1,1) | 1,1** (1,03-1,2) |
| **Diabetes** | 1,05 (0,95-1,15) | 1,1 (1-1,2) | 1,1* (1,01-1,2) | 1,07 (0,97-1,2) |
| **Neck or Back illness (prolapsed disc, sciatica, congenital spine and neck abnormalities, neck diseases)** | 0,88** (0,83-0,92) | 0,93 ** (0,88-0,98) | 0,93* (0,88-0,98) | 0,91** (0,86-0,96) |
| **Cardiovascular diseases including Hypertension** | 0,86** (0,80-0,92) | 0,88** (0,81-0,96) | 0,91* (0,84-0,98) | 0,89** (0,83-0,96) |
| **Sleep disorder** | 0,87** (0,82-0,93) | 0,90* (0,83-0,98) | 0,92** (0,86-0.98) | 0,87** (0,82-0,94) |
| **Mental health problems** | 0,90** (0,85-0,96) | 0,93* (0,88-0,99) | 0,94* (0,89-1) | 0,89** (0,86-0,96) |
| **Smoking** | 0,88 ** (0,83-0,93) | 0,82** (0,77-0,87) | 0,82** (0,78-0,87) | 0,82** (0,8-0,86) |
| **Alcohol** | 0,68 ** (0,63-0,71) | 0,57** (0,53-0,61) | 0,56** (0,52-0,6) | 0,56** (0,52-0,61) |

covariates giving 18 percent less probability of smoking and 34 percent less probability of consuming alcohol (for each unit-change). No interactions between gender and religiosity were found.

## 5. Discussion

To produce knowledge and identify factors that may improve, maintain or impair health is essential in the field of medicine as the fundamental aim of health professionals is to improve the lives of people. This is especially true when a factor without scientific evidence is suspected to impair the health of some individuals, and when the knowledge gap itself may contribute to impairment of the health of the targeted group through racism.

Our results show weak, but increased, probability of better health outcomes as importance of Islam and religious attendance increase. Hence, we reject our null hypothesis that there is an association between Muslim religiosity and negative health outcomes. As we did not find any significant association between Muslim religiosity and negative health outcomes, there is no support of the increasing perception that regards Muslim religiosity as a hinder to good health in several western countries. On the contrary, this study indicates that Muslim religiosity may play a role in improving or maintaining health, rather than impairing health of the followers of the faith.

Two key health-related behaviors were significantly associated with Muslim religiosity in this study. Alcohol is prohibited in Islamic teaching, but as Muslims in Norway live in a secular liberal democracy, compliance with Islamic teaching is an individual choice. Alcohol use is an integrated part of the society and not consuming alcohol can be regarded as a behavior that contradicts the behavior of the majority in society. Hence, a negative association between Muslim religiosity and alcohol consumption implies an active approach to Islamic teaching rather than a passive choice based on strict official regulations of alcohol which is the case in several Muslim majority countries. Muslims in Norway who uphold the Islamic teaching of not drinking alcohol through this active approach to Islamic identity, might also integrate good health behavior with regard to other health risk factors as association between Muslim religiosity and several health outcomes is found.

Although several Islamic jurists consider smoking as disliked, there is no clear prohibition of smoking in Islam. Use of tobacco, either in the form of a waterpipe or smoking cigarettes, seems to be frequent in many Muslim majority countries and among Muslim minorities in Western countries (Ghouri et al., 2006; Kjøllesdal et al., 2019). Hence the negative association between Muslim religiosity and smoking in our study, may indicate Muslim religiosity as a potential common factor behind several health behaviors. It can be explained by social mechanisms. Less attendance in venues with extensive consumption of alcohol (such as pubs and nightclubs) due to Islamic prohibition of alcohol, accounts for the coercive rules a religion may impact their adherents through according Structural theory. This may imply less exposure to smoking as smoking is common in such venues. But Muslim religiosity may also account as a causal factor of less smoking through a psychological pattern of health promoting lifestyle which Islamic teaching is embedded in. One of the arguments of Islamic prohibitions of alcohol consumption are with reference to its negative effects on health (Michalak et al., 2009). Both pathways comply with the biopsychosocial model. As the biopsychosocial model is used to understand illness as multidimensional (Engel, 1997; Wade & Halligan, 2017), the multidimensional framework of the model could also be used in understanding health behavior with not only a biological, but also with a psychological and a social dimension. Also, researchers in preventive medicine have often defined lifestyle, rather than single elements, as a latent factor underlying health behavior (Havigerová et al., 2018) and health (Mæland & Krokstad, 2016). Among Muslims, Islam is often viewed as a lifestyle with specific practices and implications on diverse aspects of life, contradicting the secular European view on religion as a private matter. Because of these different views of religious life, Islam is often criticized in Western countries due to visible practices such as the use of headscarf (Ishaq, 2017). Considering that smoking is the single risk factor causing most deaths in the richest part of the world (World Health Organization, 2009), and that smoking is more common in low-income groups and among immigrants in Norway (Kjøllesdal et al., 2019), both groups in which Muslims in Norway belong to, Muslim religiosity has the potential to play a significant role in improving health behavior among Muslims. This is important, as our study also found an association between Muslim religiosity and several other positive health outcomes.

Although functional disability may increase due to health problems and may, therefore create physical barriers to religious attendance, explaining a possible opposite causal–effect association, a positive association between Muslim religiosity and health may be contributed through social networks within the Muslim community that attendance in religious service do represent. As previous research has shown, social networks do have a positive impact on health outcomes (Mæland & Krokstad, 2016), and given that the associations between religious attendance and positive health outcomes were stronger in our study than the association between importance of Islam and positive health outcomes, social networks in the Muslim community may serve as an explanatory factor for an association between Muslim religiosity and better health outcome. However, social networks may not be the only explanatory factor as our findings do show a negative association between importance of Islam and health behavior and some of the diseases – questioning fundamental aspects of Islam as possibly health promoting. Also, previous research does define religion as a social determinant of health. Mueller et al. (2001) reviewed meta-analyses, systematic reviews, and published studies, and found that the majority of the studies showed that religiosity was associated with better health outcomes such as health related quality of life, mental and physical illness, and mortality. Although there has been a significant growth in studies on the association between Islamic faith and health, most studies on religion and health have been conducted within the context of Western

Judeo-Christian cultures (Abdel-Khalek, 2014). To our knowledge, our study is the first on a representative sample illuminating a positive association between Islam and health, and concluding with an association between Muslim religiosity and certain positive health outcomes among Muslims in Norway. In addition, our study gives no support to the perception of Islam as barrier to good health. These findings have potentially both clinical and public health implications. First, this study has identified Muslim religiosity as a factor that can maintain and potentially help to improve health and health behaviour among Muslims. To identify factors that may improve health in a minority that seems to be at a disadvantage of health, is essential. Knowledge from this study may also increase cultural competence among physicians and other health professionals, something which has been lacking in Norway. The lack of cultural competency has itself been suspected to contribute to health disparities among minorities and immigrants (Hjörleifsson et al., 2017).

Second, findings from this study may also have an implication for how health care professionals approach patients with a Muslim religiosity as Anti-Muslim hatred is increasing in many counties. Our findings suggest that health professionals should at least avoid involvement in the spread of Anti-Muslim attitudes that defines Islam as threat to health, if not also condemn all kinds of anti-Muslim attitudes defining Muslim religiosity as threat to health. On the other hand, findings from this study does not make Islam a less relevant cultural framework for tailored health care services and intervention as no negative associations between Muslim religiosity and health outcomes were found.

Yet, further research is needed given the weaknesses of this study. The cross-sectional nature of the study makes the ability to define causality difficult. Another weakness is that this study does not include objective health outcomes. It would also be interesting to study possible associations between Muslim religiosity and objective health outcome data such as systolic and diastolic blood pressure and cholesterol-levels, together with other health outcomes such as mortality. Discrimination of Muslims is also interesting to include as a co-variate when investigating the association between health and Islam, as discrimination has shown to have a negative impact on health. A qualitative study has linked some barriers in mammography-related behavior to religious belief, although the study did conclude that Islamic tailored messages aimed to enhance Muslim women's intentions to obtain mammography was helpful (Padela et al., 2018). It would be interesting to study Muslim religiosity and health care seeking behavior using a national sample of Muslims.

## 6. Conclusion

We could not find any statistically significant association between Muslim religiosity and negative health outcomes, and only associations between Muslim religiosity and positive health outcomes were statistically significant. Results from this study give no evidence of the assumption that Islamic faith is a hinder to good health among Muslims. Our hope is that these findings will pave the way for the development of culturally sensitive health policies and patient-centered health care services to Muslim patients, viewing Muslim religiosity and identity as a resource, and not as an obstacle. Because anti-Muslim attitudes are growing globally, it is of paramount importance that health care professionals have a correct and informed understanding of the association between Islamic faith and health, so that they do not participate in the spread of anti-Muslim attitudes. The approach represented in this article should therefore be implemented in the training of health-care professionals. Also, further research on this issue should be encouraged.

## Author statement

Bushra Ishaq, Conceptualization, Methodology, Investigation, Formal Analysis, Visualization, Writing Original draft, review and editing, Lars Østby, Methodology, Formal Analysis, Writing – review and editing, Asbjørn Johannessen, Methodology, Formal Analysis – review and editing.

## Role of the funding source

There were no funding sources for this study. The corresponding author had full access to all the data in the study and was responsible for the decision to submit the paper for publication.

## Declaration of competing interest

None.

## Acknowledgements

Grateful thanks to Professor Jan Helge Solbakk, Senior Researcher Ole Klungsøyr, Associate Professor Hege Cathrine Finholt and Professor Professor Lars Johan Danbolt for great support for this article and feedback on this article.

## References

Abdel-Khalek, A. M. (2014). Religiosity, health and happiness: Significant relations in adolescents from Qatar. *International Journal of Social Psychiatry, 60*(7), 656–661. https://doi.org/10.1177/0020764013511792

Abuelgasim, E., Saw, L. J., Shirke, M., Zeinah, M., & Harky, A. (2020). COVID-19: Unique public health issues facing Black, Asian and minority ethnic communities. *Current Problems in Cardiology, 45*(8), 100621. https://doi.org/10.1016/j.cpcardiol.2020.100621

Bangstad, S. (2014). *Anders Breivik and the Rise of islamophobia*. Zeed Books Ltd.

Brandvold, Å. (2021). *Ut mot «blendahvit» ledelse. [Stands up against "dazzling white" leadership .]*. Klassekampen, 18 February.

Chib, E. (2020). Islamophobia and the COVID-19 pandemic in the UK. Observer Researcher Foundation. Available from: https://www.orfonline.org/expert-speak/islamophobia-covid-19-pandemic-uk-67037/?amp. (Accessed 12 October 2020).

Considine, C. (2017). The racialization of Islam in the United States: Islamophobia, hate crimes, and "flying while Brown". *Religions, 8*(9), 165.

Doiron, D., Fiebig, D. G., Johar, M., & Suziedelyte, A. (2015). Does self-assessed health measure health? *Applied Economics, 47*(2), 180–194. https://doi.org/10.1080/00036846.2014.967382

Engel, G. L. (1997). From biomedical to biopsychosocial. Being scientific in the human domain. *Psychosomatics, 38*(6), 521–528. https://doi.org/10.1016/S0033-3182(97)71396-3

European Social Survey. (2018). *ESS Round 9 source questionnaire*. ESS ERIC Headquarters c/o City University of London. Available from: https://www.europeansocialsurvey.org/docs/round9/fieldwork/source/ESS9_source_questionnaires.pdf. (Accessed 3 November 2020).

Gearing, R. E., & Alonzo, D. (2018). Religion and suicide: New findings. *Journal of Religion and Health, 57*(6), 2478–2499. https://doi.org/10.1007/s10943-018-0629-8

Ghouri, N., Atcha, M., & Sheikh, A. (2006). Influence of Islam on smoking among Muslims. *BMJ, 332*(7536), 291–294. https://doi.org/10.1136/bmj.332.7536.291

Guillot, M., Khlat, M., & Wallace, M. (2019). Adult mortality among second-generation immigrants in France. *Demograpic Research, 40*, 1603–1644. https://doi.org/10.4054/DemRes.2019.40.54

Hassan, S. H. (2015). Effects of religious behavior on health-related lifestyles of Muslims in Malaysia. *Journal of Religion and Health, 54*(4), 1238–1248. https://doi.org/10.1007/s10943-014-9861-z

Havigerová, J. M., Dosedlová, J., & Burešová, I. (2018). One health behavior or many health-related behaviors? *Psychology Research and Behavior Management, 12*, 23–30. https://doi.org/10.2147/PRBM.S173692

Helsetilsynet. (2019). *Stadig nedsettende omtale av muslimer – mangelfull kommunikasjon, diagnostikk og behandling – advarsel til legevaktlege. [Constantly derogatory mention of Muslims- inadequate communication, diagnostics and treatment – warning to emergency doctor.]*. Statens Helsetilsyn, 26 June 2019. Available from: https://www.helsetilsynet.no/tilsyn/tilsynssaker/2019/stadig-nedsettende-omtale-av-muslimer-mangelfull-kommunikasjon-diagnostikk-og-behandling/. (Accessed 15 March 2020).

Hjörleifsson, S., Hammer, E., & Díaz, E. (2017). General practioners' strategies in consultations with immigrants in Norway. Practice-based shared reflections among participants in focus groups. *Family Practice, 35*(2), 216–221. https://doi.org/10.1093/fampra/cmx097

Holmøy, A., & Wiggen, K. S. (2017). *Levekårsundersøkelsen blant personer med innvandrerbakgrunn 2016. Dokumentasjonsrapport. [The Survey on living conditions among persons with an immigrant background 2016. Documentation.]*. Statistics Norway. Notater 2017/20 https://www.ssb.no/sosiale-forhold-og-kriminalitet/artikler-og-publikasjoner/_attachment/309526?_ts=15c361c0140.

Idler, E. L., & Benyaminini, Y. (1997). Self-rated health and mortality. A review of twenty-seven community studies. *Journal of Health and Social Behavior, 38*(1), 21–37.

Inhorn, M. C., & Serour, G. I. (2011). Islam, medicine, and Arab-Muslim refugee health in America after 9/11. *Lancet, 378*(9794), 935–943. https://doi.org/10.1016/S0140-6736(11)61041-6

Ishaq, B. (2017). *Hvem snakker for oss? Muslimer i norge – hvem er de og hva mener de? [Who speak for us? Norwegian Muslims – who are they, and what are their attitudes?] Cappelen Damm*.

Ishaq, B., Aukrust, P., Diaz, E., Solbakk, J. H., Østby, L., Bjertness, E., Tyssvang, M., & Pedersen, R. (2021). *Hvorfor er koronasmitten så høy blant minoriteter? Vi trenger grundige analyser. [Why so much coronavirus among minorities? We need thorough analyzes]*. Aftenposten, 19.April. Available from: https://www.aftenposten.no/meninger/kronikk/i/9Owo1W/hvorfor-er-koronasmitten-saa-hoey-blant-minoriteter-vi-trenger-grundige. (Accessed 19 April 2021).

Jamal, M., & Badawi, J. (1993). Job stress among Muslim immigrants in North America: Moderating effects of religiosity. *Stress Medicine, 9*, 145–151. https://doi.org/10.1002/smi.2460090304

Johnston, D. W., & Lordan, G. (2012). Discrimination makes me sick! an examination of the discrimination-health relationship. *Journal of Health Economics, 31*(1), 99–111. https://doi.org/10.1016/j.jhealeco.2011.12.002

Kawachi, I. (2019). Religion as a social determinant of health. *American Journal of Epidemiology, 189*(12), 1461–1463. https://doi.org/10.1093/aje/kwz204

Kjøllesdal, M., Straiton, M. L., Øien-Ødegaard, C., Aambø, A., Holmboe, O., Johansen, R., Grewal, N. G., & Indseth, T. (2019). *Helse blant innvandrere i Norge. [Health among immigrants in Norway]*. Norwegian Institute of Public Health.

Laird, L. D., de Marrais, J., & Barnes, L. L. (2007). Portraying Islam and Muslims in MEDLINE: A content analysis. *Social Science & Medicine, 65*(12), 2425–2439. https://doi.org/10.1016/j.socscimed.2007.07.029

Latif, F., Helgeland, J., Bukholm, G., & Bukholm, I. R. (2015). Ethnicity differences in breast cancer stage at the time of diagnosis in Norway. *Scandinavian Journal of Surgery : SJS : official organ for the Finnish Surgical Society and the Scandinavian Surgical Society, 104*(4), 248–253. https://doi.org/10.1177/1457496914565420

Leidig, E. (in press). "#CoronaJihad": How the far-right in India is responding to the pandemic. In T. Bar-On & B. Molas (Eds.), Responses to the covid-19 pandemic by the radical right. Ibidem Press:.

Mæland, J. G., & Krokstad, S. (2016). Sosiale faktorers betydning for sykdom og helse. [The influence of social factors on illness and health]. In S. Krokstad (Ed.), *Sosialmedisin [social medicine]* (pp. 58–76). Gyldendal Akademisk.

Martin, M. B. (2015). Perceived discrimination of Muslims in health care. *Journal of Muslim Mental Health, 9*(2). https://doi.org/10.3998/jmmh.10381607.0009.203

McIntosh, L. (2015). Impossible presence: Race, nation and the cultural politics of 'being Norwegian'. *Ethnic and Racial Studies, 38*(2), 309–325. https://doi.org/10.1080/01419870.2013.868017

Michalak, L., Trocki, K., & Katz, K. (2009). I am a Muslim and my dad is an alcoholic – what should I do?": Internet-based advice for Muslims about alcohol. *Journal of Muslim Mental Health, 4*(1), 47–66. https://doi.org/10.1080/15564900902771325

Mpofu, E. (2018). How religion frames health norms: A structural theory approach. *Religions, 9*(4), 119. https://doi.org/10.3390/rel9040119

Mueller, P. S., Plevak, D. J., & Rummans, T. A. (2001). Religious involvement, spirituality, and medicine: Implications for clinical practice. *Mayo Clinic Proceedings, 76*(12), 1225–1235. https://doi.org/10.4065/76.12.1225

Padela, A. I., & Curlin, F. A. (2013). Religion and disparities: Considering the influences of Islam on the health of American Muslims. *Journal of Religion and Health, 52*(4), 1333–1345. https://doi.org/10.1007/s10943-012-9620-y

Padela, A. I., Malik, S., Vu, M., Quinn, M., & Peek, M. (2018). Developing religiously-tailored health messages for behavioral change: Introducing the reframe, reprioritize, and reform ("3R") model. *Social Science & Medicine, 1982*(204), 92–99. https://doi.org/10.1016/j.socscimed.2018.03.023

Pandey, A. (2020). *On camera, UP doctor's hate rant against islamic sect members*. NDTV. Available from: https://www.ndtv.com/india-news/coronavirus-on-camera-up-doctors-hate-rant-against-islamic-sect-members-2238882. (Accessed 28 August 2020).

Rizvi, M. A. K., & Hossain, M. Z. (2017). Relationship between religious belief and happiness: A systematic literature review. *Journal of Religion and Health, 56*(5), 1561–1582. https://doi.org/10.1007/s10943-016-0332-6

Rose, T. C., Mason, K., Pennington, A., McHale, P., Buchan, I., Taylor-Robison, D. C., & Barr, B. (2020). Inequalities in COVID19 mortality related to ethnicity and socioeconomic deprivation. *medRxiv*. https://doi.org/10.1101/2020.04.25.20079491, 2020.2004.2025.20079491.

Saleem, T., & Saleem, S. (2020). Religiosity and death anxiety A study of Muslim dars attendees. *Journal of Religion and Health, 59*(1), 309–317. https://doi.org/10.1007/s10943-019-00783-0

Samari, G., Alcalá, H. E., & Sharif, M. Z. (2018). Islamophobia, health, and public health: A systematic literature review. *American Journal of Public Health, 108*(6), e1–e9. https://doi.org/10.2105/AJPH.2018.304402

Saquib, N., Saquib, J., Alhadlag, A., Albakour, M. A., Aljumah, B., Sughayyir, M., et al. (2017). Health benefits of Quran memorization for older men. *SAGE Open Medicine, 5*. https://doi.org/10.1177/2050312117740990

Statistics Norway. (1999). Statistikk mot år 2000:1978-1979. Den første levekårsundersøkelsen. [Statistics towards the year 2000: 1978-1979. The first survey on living conditions]. Available from: https://www.ssb.no/sosiale-forhold-og-kriminalitet/artikler-og-publikasjoner/den-forste-levekaarsundersokelsen. (Accessed 2 October 2020).

Strand, B. H., Dalgard, O. S., Tambs, K., & Rognerud, M. (2003). Measuring the mental health status of the Norwegian population: A comparison of the instruments SCL-25, SCL-10, SCL-5 and MHI-5 (SF-36). *Nordic Journal of Psychiatry, 57*(2), 113–118. https://doi.org/10.1080/08039480310000932

Tey, S. E., Park, M. S., & Golden, K. J. (2018). Religiosity and healthy lifestyle behaviours in Malaysian Muslims: The mediating role of subjective well-being and self-regulation. *Journal of Religion and Health, 57*(6), 2050–2065. https://doi.org/10.1007/s10943-017-0420-2

Townsend, M., Kladder, V., Ayele, H., & Mulligan, T. (2002). Systematic review of clinical trials examining the effects of religion on health. *Southern Medical Journal, 95*(12), 1429–1434.

Vrålstad, S., & Wiggen, K. S. (2017). *Levekår blant innvandrere i Norge 2016. [Living conditions among immigrants in Norway 2016]*. Rapporter 2017/13. Statistics Norway. Available from: https://www.ssb.no/sosiale-forhold-og-kriminalitet/artikler-og-publikasjoner/_attachment/309211?_ts=177710adf90. (Accessed 2 May 2020).

Wade, D. T., & Halligan, P. W. (2017). The biopsychosocial model of illness: A model whose time has come. *Clinical Rehabilitation, 31*(8), 995–1004. https://doi.org/10.1177/0269215517709890

World Health Organization. (2009). *Global Health Risks. Mortality and burden of disease attributable to selected major risks*. World Health Organization. Available from https://apps.who.int/iris/handle/10665/44203. (Accessed 1 May 2020).